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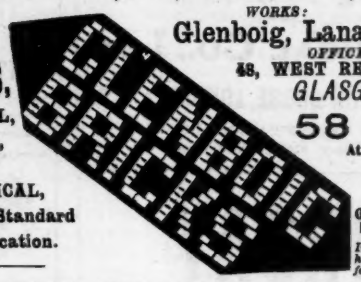

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CL., No. 2970.] TUESDAY, APRIL 13, 1920. [72ND YEAR.

EDITORIAL NOTES.

A Little Knowledge—

IT is understood from the "Bulletin of the Federation of "British Industries" that that body is setting-up a Committee to consider the new Gas Bill that is to be introduced by the Board of Trade, it is believed, soon after the re-assembling of Parliament. It is to be hoped that the Committee will incorporate men who, from intimate and practical knowledge, understand the gas industry, its processes, the chemistry of gas, and the science of the combustion of gases. There is reason in making this suggestion, in view of the reports, regarding other matters than gas, that have issued from Government appointed Committees, and which have proved that the subject investigated has not been dealt with by technically competent men. There is still more reason when we see the announcement in the "Bulletin" succeeded by an article by Mr. David Flather, who is a member of a steel firm in Sheffield, and is the Chairman of the Gas Consumers' Association in the city. Mr. Flather apparently believes that it is his mission to do all he can to promote Associations on the lines of that of which he is Chairman, so as to thwart the gas industry's administrators who—this is not directly expressed, but is implied—have no conscience, but are bent upon dishonourable and avoidable practices, which it seems to us should, if true, speedily result in the "fall of the curtain" on the main business of the industry. That is the interpretation we put upon Mr. Flather's article and his attitude. If men of such pronounced views as this gentleman are to dominate the Committee of the Federation of British Industries, then we feel assured, from the article before us, that justice will not be done—we do not say deliberately—to the gas industry, and the chances are that the Federation will not be guided aright as to the action it should take in relation to the Bill when it is presented.

We believe Mr. Flather is conscientiously of opinion he is right in all that he says. But what he says shows an amount of ignorance that induces him unconsciously to wander distantly from fact. He leads off with a misstatement. "The gas industry," he avows, "has hitherto known "no real control." This will be news to the administrators and technical officials of the gas industry, who know only too well that it is not a dream but solid fact that they have been working laboriously in heavy statutory harness. The industry can, with the utmost warrant, challenge Mr. Flather to point to any other industry that has had more control exercised over it than it has had. The control was somewhat relaxed during the war for two reasons. National necessity demanded from the gas industry benzol and toluol and other materials. Shortage of coal, and coal that imposes a weighty burden on the industry through the quantity of inert refuse it contains, has been largely responsible for any depreciation there has been in gas in respect of incombustibles. The shortage continues; and from the collieries there still comes in every ton delivered an abnormal quantity of rubbish. Where is the justification then for such an assertion as: "The gas suppliers appear to have formed the opinion "that gas consumers, having had to make the best use they "could of bad gas or do without, might not object, even "after the need had passed, to continue to use the existing "quality." "After the need had passed!" Gas undertakings have small stocks of coal. A few weeks ago, the authorities of the Coal Control Department were informed that there were over 400 gas-works with less than a week's stock in hand, and some with only two or three days', and that coal was not what it used to be in days before the collieries and the miners were paid for an excessive amount of material that is not coal. Mr. Flather would be using his efforts to better effect on behalf of the gas consumers by working for a condition of things that would make the position easier for the gas industry, than by endeavouring, by the aid of denunciation, to agitate consumers against the industry. He urges the consumers to wake up and "pro-"tect themselves against the injustice, and to reform the "bad service for which they pay so high a price." Is it a "high price?" Has the price of gas risen to the same extent as steel and other commodities? Is the high price reflected in the dividends paid on the greater proportion of the capital of the industry? Is it reflected in surplus profits?

A more singular statement from a business man, and one who thinks that he knows something about what he is writing, we have rarely seen than the one which follows. He describes the staple product of the industry as a "bye-"product!" "Do consumers," he asks, "realize that the "gas they pay a high price for is now merely a bye-product, "and that the gas companies are fully awake to the fact "that what they looked upon formerly as the 'waste pro-"'ducts' of gas making are actually remunerative?" We should like Mr. Flather to tell us how long ago it is since the gas industry looked upon its secondary products as being "waste" ones. Perhaps, too, it is not within his knowledge that, though the prices of the secondary products are higher than they were before the war, they are now yielding a lower percentage of the cost of the coal than they did prior to the war. He also charges gas companies with having supplied more inerts in the gas during the war without making an allowance in the price. Where the "allowance" would have come from is an interesting problem from which Mr. Flather judiciously steers clear. From what has already been said, it will have been seen that, in order to make an allowance, it would have been necessary—the critic should mark this—to have first of all charged a higher price. Mr. Flather must remember that the gas industry exists in other places besides Sheffield. It is an absolute fabrication to say that the average percentage of inert gases previous to the war was about 5½ p.ct. Perhaps Mr. Flather will tell us how to make gas with so low a percentage of inert gases in it as the figure just mentioned; and also, as he professes to such an extensive knowledge of these matters, the percentage of the total gas supplied in the United Kingdom that contains 30 to 40 p.ct. of incombustibles in it.

Fortunately, however, the Board of Trade are (we learn from Mr. Flather) awake to these facts; and in the General Bill that they are about to promote, they will provide many safeguards to the consumers' interests. But here is the point. Mr. Flather "wishes to warn consumers that, when "the Bill is framed, the whole army of experts employed "by the gas undertakings will be marshalled to win every "possible advantage for their employers, and to control to "the utmost the needs of industrial and domestic con-"sumers." What ill-conditioned monsters we of the gas industry are! According to the critic, we are absolutely oblivious—yet we thought we were very much alive to it in the greater part of the gas industry—of the fundamental fact in the gas business that the interests of the consumers and of the industry are of a mutual order. Of course, Mr. Flather knows better. Therefore he urges the formation of gas consumers' associations throughout the country on the lines of the one at Sheffield, about which he gives some information, and incidentally trips-up over a tale of percentages. Percentages are very misleading things unless one knows something as to their bases. Mr. Flather says: "While the supply of electric current by the Sheffield Cor-

"poration increased 550 p.ct. between 1914 and 1918, the "gas supply increased only by 26½ p.ct.; and it should be "noted that this *small* increase was due to the dilution of the "gas by the addition of inerts." We have not the figures for the exact years mentioned by Mr. Flather. But we see from the "Manual of Electrical Undertakings" that in 1914 the sale of electric current in Sheffield was 26,546,718 units; and the "Electrical Times" tells us that in 1919 the sale was 161,839,041 units. The increase between these years was, therefore, 135,292,323 units, or 509 p.ct. The Board of Trade gas returns (the last issued before the war) tell us the sale of gas in Sheffield in 1913 was 4,546,023,000 c.ft. We believe the increase in the following year was about 90,000,000 c.ft.; so that the sale in 1914 may be taken to be approximately 4,636,023,000 c.ft. Now what a foolish thing to compare percentages based on two such dissimilar foundations as 26,546,718 units and 4,636,023,000 c.ft. A 26½ p.ct. increase on 4,636,023,000 c.ft. is 1,228,546,095 c.ft., which is equal to over 9 c.ft. for every unit of increase in electricity sold. If we reckon the gas averaged throughout the six years only 450 B.Th.U., the increase in the gas consumption represents 552,845,742,750 B.Th.U.; whereas the increase in electricity consumption was equal to 462,699,744,660 B.Th.U.—a difference in favour of gas of 90,145,998,090 B.Th.U. If our figures were revised to the actual, we have not the slightest doubt that they would appear still more favourable to gas. However, we are surprised at Mr. Flather letting himself into such a hole over a question of percentages.

There is much more in the article that invites criticism, and that shows Mr. Flather is not very deeply versed in the scientific side of gas manufacture and use. Perhaps he will give us another opportunity to test his knowledge to greater extent; but on this occasion we have occupied quite sufficient space in dealing with his unconscious errors in the "Bulletin of the Federation of British Industries."

Horse Power Required for Handling Hard and Dirty Coal.

The general air and tone of the informal meeting of Scottish Gas Managers are always to our liking. The very idea of informality gives a sense of freedom, and generally produces interesting experiences, based upon addresses from the chair which, as a rule, rove over topical subjects of importance to the industry. The meeting last Wednesday was no exception to the rule; nor was the address of the President (Mr. John M. Smith, of Stirling). There was life in it from beginning to end. But if there was one part which interests us more than another, it is that which shows some, though not all, of the disadvantages under which gas-works to-day operate through having coal delivered to them unsuitable for their purposes. Complaints have been rife as to this ever since coal control began to interfere as between user and the source of supply, and ignored the economic relationship that should obtain between quality of raw material and production. Want of this recognition has been, we are quite convinced, more costly to the country, combined with the colossal folly of conveying from the mines and distributing about the country a large amount of inert material, than all the savings (if actually any) that have been effected by the distribution methods of the Coal Mines Department. Mr. Smith does not show all the adverse results to Stirling from this maladministration. There is suitable gas-making coal—good for the yield of gas, coke, and other secondary products—within one to five miles of the town; but for a time coal was sent, and 50 p.ct. is still (we understand) being sent to the gas-works, from pits thirty miles away, that is altogether unfit for the purposes of the gas manufacturer. The burden of this upon the Gas Company, and the strain on their plant, have been anything but light, besides spoiling to a large extent the quality of the coke.

It is in respect of the effect of bad coal upon the power plant that handles the coal that Mr. Smith publishes some information that is striking testimony to the stupidity of disregarding the quality of suitability. All through, the hard, dirty, and bad coking coal requires more power in handling it than the local soft, clean, and good coking coal; and the electric-motors have been set a task which has run them dangerously close to their maximum power. The maximum horse-power of the coal-breaker and elevator motor is 20; but the half-dozen different coals sent from a distance required 18 to 21 maximum horse-power to break and elevate them, as compared with 10 H.P. for the local coal. The average power required was 16·5 to 17·5 H.P. for the different coals from a distance, as compared with 9 H.P. for the local coal, which is described as "soft and clean," while the other coals contained from 18 to 27 p.ct. of foreign material, and were "medium" or "very hard." For starting and pushing the charges 9·5 to 11 H.P. was required, from a 11-H.P. motor; while the local coal only required 6·5 H.P.—the averages being 5 to 6 H.P., and for the local coal 3·5 H.P. We are not surprised to learn that mechanical troubles were in consequence very serious; and certain it is that the wear and tear on the motors and plant have been greatly in excess of what they would have been had local coal only been employed. Coals from a distance are also of poor coking property. Whereas their coke production ranged from 9 to 10 cwt., the local coal yields 14 cwt. But worse than that, the proportion of the production that would pass through a 1-in. screen ranged from 35 to 65 p.ct. in the case of the inferior coals; while from the local coal 7 p.ct. is the quantity that will pass through a 1-in. screen.

If the quantity of inerts in the coal and the maximum horse-power required are studied, there appears to be a relation between the two, but not a proportionate one. For instance, in three cases the maximum horse-power required for breaking and elevating is equivalent to the percentage of inert material. There is, however, another coal containing 25 p.ct. of foreign material; and it requires 18 H.P. maximum and 16·5 H.P. average for breaking and elevating, which are precisely the same maximum and average horse-powers as are required for a coal containing 7 p.ct. less of inert material. In both cases, the hardness of the coal is described as "medium." The "hardness" is, of course, a contributory—in fact, no doubt the superior—cause of the additional power required. There is another case of a "very hard" coal, with a large seam of foreign material running through it; and for this 21 H.P. maximum, and 17·5 H.P. average, are required for breaking and elevating. Another coal containing as high as 27 p.ct. of inert material, is described as "very hard;" and this demands the second highest power to break and elevate it—19 H.P. maximum, and 17 H.P. average. The local coal on the other hand, being "soft and clean," claims little more than half the horse-power—10 H.P. maximum, and 9 H.P. average—for breaking and elevating. The figures, however, point to both hardness and inert material being causes demanding additional power in dealing with them. The figures are highly interesting; and it would be instructive to learn of experiences in other directions. If this sort of thing is to continue—the allocation to gas undertakings of hard coal containing a large percentage of inert material—it will mean that there will have to be a revision of the margin of safety in respect of power for dealing with the coal.

The interesting experiences in this matter of the power required to drive the coal-handling plant using different quality coals, reminds of a paragraph in the recent Presidential Address of Mr. James R. Duff, of Banbury, to the Midland Association of Gas Engineers and Managers. In connection with his retort-house extensions, power plant was adopted; and, in the first instance, a 13 H.P. electric-motor was used for driving the coal-crushing plant. The breakdowns, however, were so numerous that the motor was discarded. We should imagine that these troubles were due more to the location of the motor than to the quality of the coal, though perhaps, in view of what Mr Smith says, Mr. Duff will tell us whether or not there were any variations in the coal that were contributory causes of breakdown. The motor was situated in the breaker-pit, which was anything but a satisfactory position, owing to damp and coal dust. Electric-motors are rather particular, if proper behaviour is required of them, as to having comfortable surroundings. The motor at Banbury was replaced by a compound steam-engine, which was fixed above the coal-breaker on the ground floor, and connected by a chain drive. If any foreign substance now gets into the crusher, the steam-engine is pulled-up before any damage can be done, as its reserve power is very small. This indicates that the trouble with the electric-motor was not only due to damp and dust, but to foreign material in the coal getting into the breaker.

Inerts in Coal a National Question.

Why the excess inerts in coal affect the gas industry to such an alarming extent is that these foreign substances not only depreciate the efficiency of plant, but also affect the quality and quantity of the undertaking's products. Coke

is especially degraded in quality; and the quantity of gas, tar, ammonia, and other commodities are all diminished per ton of coal handled. It is a very serious business for the gas industry—more so than for many other industries the quality of whose productions are not seriously affected by the depreciated quality of coal. Other industries feel it most in the lowered efficiency of their power and heat producing plants. In precisely the same place, the gas industry suffers, but with (in addition) the lessened capacity of the carbonizing plant, and the reduced quality and quantity of product per ton of coal. Mr. Sutcliffe Smith, the President of the Bradford Chamber of Commerce, a few days ago called attention to the serious state of affairs that has arisen in the industries of Bradford through the inferior coal supplied to them. He says that the annual consumption of engine fuel in the city is about a million tons; and, on a conservative basis, 7½ p.ct. of this, or 75,000 tons, is inert material that could be eliminated at the pits. The estimate is indeed a very conservative one; for inert material in coal supplied to gas-works varies to-day between the figure named and 20 p.ct. in excess of the quantity found in coal prior to the war. The trouble, Mr. Sutcliffe Smith says, is due to two causes—the unsatisfactory screening and washing of coal, and limitation of prices. We are surely paying enough for coal to-day; but still Mr. Sutcliffe Smith thinks that a reasonable extra profit for the colliery companies on coal which is properly screened, graded, or washed, would be an advantage. While we have the deepest sympathy with Bradford over this question, it is no more nor less than we have for the rest of the country, as this is a matter which ought to be taken-up, dealt-with, and agitated-over on a national basis. The loss to Bradford is infinitesimal compared with the whole country. Last year our inland consumption of coal—coal which had to be conveyed about the country, and handled in all sorts of ways—amounted to about 180 million tons; so that if 10 p.ct. represented the inerts in excess of the condition in pre-war times, there were 18 million tons of inert material opposed to the best attainable efficiency and economy of and in the country. The 75,000 tons mentioned by Mr. Sutcliffe Smith looks small in comparison. Hence the need for agitation on a national basis. He puts the excess of inert material in the coal down to the present practice of unsatisfactory screening and washing. No doubt it is—partially; but what happens before the screening and washing stage? Let us look a little deeper. Effective coal and inerts control exists at the mines, and not at Westminster. The miners in most districts are now paid for all they produce in the way of dirt, bats, and bind, at the same price as for good coal. What they produce and are paid for is largely passed on to the coal consumer, who pays for it all at the same price as for good coal. Now that the practice of paying for all the material raised has become established among the miners, there is not much hope of consumers getting relief from foreign substances in coal without paying handsomely for it.

The Tale of Cost Details.

Twenty years have passed since the first annual meeting of the Manchester and District Junior Gas Association was held, and this period has seen within the industry a vast change. As the new President (Mr. J. Bridge, of Bolton) said in his Inaugural Address on Saturday last, the Association has good reason to be proud of its position, progress, and work. The Association was in fact a pioneer on new ground; and it was our pleasure some years ago now to use the organization as an example in stimulating union generally among the juniors of the industry for technical discussion, and providing opportunities for making a broader survey over the operations of the industry. With what success this was done is now well known. Through the Junior Associations the industry to-day knows more of the grit, value, and qualifications of its rising technical officials than it ever knew before.

This by the way. Mr. Bridge's Presidential Address is before us; and in it he went pretty fully into a matter that is big with importance to an industry the technical work of which is of such composite character, and, on its productive side, depends so much for efficiency and economy on a scientific accuracy of control. The matter of chemical control has often been treated upon, and so has control of manufacture by day-by-day recording and comparing the working results. There is, however, the financial side of control to make the system complete; and this is the direction Mr. Bridge pursued in inditing his address. In brief, it is an argument for the careful keeping in fuller detail, with an analysis (say) week by week or month by month, of all costs, so that the exact places in which variations up and down occur and the extent of them may be ascertained, and their cause noted. If the cause is unavoidable, there is an end to the matter; if avoidable, it can at once be dealt with, and its continuance be obviated. As Mr. Bridge says, the control afforded claims some trouble, but it pays well. Nevertheless, control by the recording in detail of data as to costs, with their analysis, is neglected by many works, and is, in fact, a matter of indifference to the powers that be. This, we rather fear, is due to a want of appreciation of value, or to a passive attitude resulting from training in a works where such records are not the fashion.

Now is an exceedingly good time to make a start in this recording in detail of costs per unit of production, or per ton of coal handled. The level of costs has risen very substantially the last five years; the level of costs will never descend now to the place it occupied before, although it may do so partially by considerable changes in manufacture itself. A detailed record of costs begun now (if not already the practice) will show progressively how the manufacturing changes permitted and promoted by coming statutory enactment affect costs per unit of production. The highest attainable economy and efficiency must be realized by a gas-works to-day, with the prices of requirements—labour and material—what they are, and with competition assailing on all sides; and this is one way to realization. Systematic compilations, too, will assist comparisons between plant and plant, and works and works, and so enable judgment to be made as to the plant that is the most economical in relation to production. There has never been safety in making working comparisons, because of the absence of knowledge of the details hidden away in the totals presented. This would be altered if all works followed a common course in this matter of detailed record.

We will not go specifically into the several points of Mr. Bridge's case (which can be read in other columns) for a systematic keeping and rendering of detailed costs. There is no denying the value in the promotion of economy and efficiency; and the more complete the system, the greater the value.

Coke.

Among the uncertainties of the future are the market position and values of the secondary products of gas manufacture. What is likely to happen in regard to them is open to much speculation. But Mr. John M. Smith, of Stirling, in the address he delivered at the Informal Meeting of Scottish Gas Managers, looks upon the present position as satisfactory. Taking coke first, he does not find the demand for it increasing for household purposes, but the present sale is good, and so are prices. In considering gas manufacture in future, the probabilities have to be taken into account. Coke demand and value owe the position they occupy to-day solely to the conditions that prevail in regard to coal. If coal conditions are modified for the better, and more of it is released for export, the situation of coke will undergo an alteration. The gas industry must look to the future, and not let its contentment as to the present place of coke bar discretion and thought as to the coming years. There are two ways in which to work for the (in relation to coal prices) profitable disposal of coke in future. One is by cultivating the demand which has already firmly set in for steam-raising purposes, and the other is to turn a good part of the production into gas. Gas is a more popular domestic fuel than coke; and steam users on the large scale are learning more of the advantages of using coke (under proper conditions) in the raising of steam. The Greenwich electric power station has not adopted the Nicol patent "Sandwich" system merely for the fun of making a change; and the Manchester Corporation Electrical Engineer has not made provision for its use in connection with his new generating plant for any but economic reasons.

Tar and Sulphate.

Another matter which finds commendation in the eyes of Mr. Smith is the final settlement with the tar distillers. He shows how prices have steadily increased in his case from 1·78d. per gallon to 4·12d. per gallon. The great change in road traffic (which will continue) has created a demand for tar for road

making and preservation which will grow to larger dimensions; and Mr. Smith looks far ahead to good values being maintained for this class of tar. But he sees competition on the horizon. This, he thinks, will come from Mexican bitumen mixtures. Bitumen, however, is now about £12 5s. per ton. When shipping freights are reduced, then the price of bitumen will fall; but although the output of shipping is increasing at a rapid rate, the volume of transport to be done is considerable, and freights have a somewhat fluctuating tendency. Freights, too, are not ever likely to be what they were before the war with capital costs, repairs, maintenance, coal, labour, food—in fact, all charges involved—on a scale which will be permanently greater than before the war. Mr. Smith is a strong upholder of organized work in an industry such as that of gas supply; and he speaks well of what co-operative activity is doing in connection with sulphate of ammonia, although, in this as other things, all co-operative work must be supplemented by local effort. He tells of the preference of the farmers of Stirlingshire and Perthshire for sulphate of ammonia. They have entirely discontinued the use of nitrate of soda; and experience is that sulphate is superior to nitrate for hay growing. With the value of sulphate to-day, 66s. worth of it put on the land enables a crop of hay, valued at about £24, to be reaped. That is the experience in Mr. Smith's locality; and therefore the farmers find sulphate a very good proposition as a fertilizer. As to the future, producing schemes of a synthetic character and otherwise are threatening competition; and it may be that the time is not remote when prices will be affected. A close watch will have to be kept on developments.

Steaming in Horizontal Retorts.

Another matter mentioned by Mr. Smith is the steaming of charges in horizontal retorts. He has had a valuable experience of this, and has formed an opinion that it is better to make water gas separately. This opinion he is putting into practice; and he is not alone among gas engineers in his preference. But there are other gas engineers who have adopted the steaming of horizontal retorts on systematic lines who find it advantageous. Some striking remarks were made by Mr. R. J. Rew regarding this matter at the last meeting of the Devon Gas Association, as reported in the "Journal" a week ago [p. 35]. He stated that the profits of the Association had nearly doubled in the two years they had been using the steaming process with horizontals. While the price of gas supplied by many companies had been advanced 100 p.ct., the average increase to their own consumers was but 40 p.ct. Further experiments had been decided upon, with a view to adapting the process to larger works on the lines that all coal carbonized should be subjected to steaming for a short period rather than a small portion of it for a longer time.

Labour Clouds.

Clouds are again gathering in the labour world. The country never seems to be free from labour trouble now. As soon as there is a settlement in one quarter, comparisons are made in other quarters, with the result that there is a fresh epidemic of demand for further advances. The facts that the miners have been offered a flat-rate minimum of 2s. per day, that the Court of Inquiry have recommended a minimum of 16s. per day for dockers, and that further increases have been awarded by the Industrial Court to workers in the engineering and other trades are considered sufficient justification for the two Railway Unions to make jointly a claim for £1 a week rise for all workers (excluding shopmen), quite apart from, and irrespective of, the sliding-scale under which the men are now entitled to an extra shilling per week. The last agreement it is stated is, in the light of developments, inadequate and very unsatisfactory to the men. The matter is to be dealt with under the new machinery set up by the recent settlement. There has been preliminary consideration by the Central Wages Board, which is representative of the railway companies and railway unions; and should there be failure to arrive at an agreement, the matter will go before the National Wages Board. Under the new machinery and agreement, a strike cannot take place until four weeks after the reference to the National Board. The question of whether the miners will accept the Government offer is now the subject of a ballot; and the result will no doubt be known this week. Though some of the districts are against acceptance, it is believed that the result of the vote will be favourable. Another matter which has to be noted is that early in May there is to be a meeting of the Triple Alliance, at which there will come under review the wages demands of the miners, the railwaymen, and the transport workers in relation to the new "minimum" of the dockers and other sections embraced by the Transport Federation. It is also hinted that developments will take place particularly in regard to the inclusion of other Unions in the Triple Alliance.

PERSONAL.

At yesterday's [Monday's] meeting of the Nottingham City Council, a report from the Gas Committee was received recommending the appointment as Consulting Accountant to the department, at a remuneration of £500 per annum, of Mr. William Garton, whose resignation from the accountancy control, after a long period of service, has already been announced. The Committee further recommended that Mr. R. H. Mason, A.S.A.A., who has been in the department a number of years, and has for some time occupied the position of chief assistant to Mr. Garton, should be appointed to the position of Gas Accountant, under the supervision of the General Manager, at £500 per annum for a period of six months, and from that time permanently provided that his services are satisfactory.

Mr. R. E. Wackrill is retiring from the position of Secretary of the Chelmsford Gas Department, as from May 31. In accepting his resignation, the Gas Committee placed on record their high appreciation of the services rendered by him as Secretary since the gas-works were taken over by the Council on March 31, 1917. The question of filling the vacancy was referred to a Sub-Committee.

Mr. A. Bell, Gas and Water Outdoor Manager to the Aldershot Gas, Water, and District Lighting Company, has been presented with a handsome canteen of cutlery by the staff and members of the Distribution Department, on taking up an appointment with Messrs. Pass & Co., of Denton. In making the presentation, Mr. R. W. Edwards, the Managing Director, referred to the services rendered by Mr. Bell during the many years he had been with the Company. Another presentation to Mr. Bell consisted of a fountain pen, given by members of the Panmure Lodge of Freemasons.

At a meeting of the Directors of Barrhead (N.B.) Gas Company, Ltd., held last Wednesday, Mr. J. Carmichael tendered his resignation as Manager after thirty-four years' service. Mr. Carmichael has taken this step on account of very indifferent health. The Directors reluctantly accepted his resignation, and expressed the hope that he would be speedily restored to health.

Institution of Gas Engineers Programme.—No Excursion this Year.

We have received from the Secretary of the Institution of Gas Engineers (Mr. Walter T. Dunn) notification that, as it has been found impracticable to make satisfactory arrangements for the suggested visit on Friday, June 4, this part of the programme has been abandoned.

Corrosion in Central Heating Systems.

As a contribution to the literature on the corrosion of iron and steel, and as a guide to engineers designing such installations, the United States Bureau of Mines have published a paper by Mr. F. N. Speller on "Abatement of Corrosion in Central Heating Systems." In this the author says that pipes for water heating in buildings do not suffer seriously from corrosion if the same water is circulated repeatedly through them; but if a considerable proportion of make-up water is put into the system, the corrosion becomes rapid, especially in districts where the water is comparatively soft. Under such conditions, when considerable water is used, hot-water supply-pipes of galvanized wrought iron and steel frequently fail by perforation after seven or eight years' service. In a study of this problem, the author found some systems using open heaters, wherein the water was allowed to come to rest for several minutes at a temperature of 100° Fahr. or higher, thus discharging the bulk of the gases. Pipes when used under these conditions showed practically no corrosion after ten years' service. In a hot-water installation arranged on the old system, the oxygen rapidly decreased as the water passed from the heater and storage tank through the system, and back to the storage tank through the return. In this circuit, the water lost about 90 p.ct. of its oxygen content. To a similar system was attached a storage tank filled with expanded steel lathing, and a filter to clarify the water. In this system practically all the free oxygen is removed in the storage tank. After three years under these conditions, there was practically no corrosion in the pipes carrying this "deactivated" water. This illustrates the cause of the trouble, and an inexpensive remedy.

Next Saturday afternoon, the Yorkshire Junior Gas Association are to meet in the Bradford Corporation Gas Show-Rooms, Darley Street, when Mr. E. L. Oughton, of Huddersfield, will read a paper entitled "Random Notes Mainly on Housing Schemes."

TWO BELATED GAS ACTS.

When in October last reviewing the Gas Acts for 1919, there were two which had not completed their parliamentary course. They were the measures promoted by the Ammanford Gas Company and the Swinton and Mexborough Gas Board. These have received the Royal Assent.

In their Act, the Ammanford Gas Company obtain confirmation of an agreement for the transfer to them of the Garnant Gas Company's undertaking, the capital of which consists of £10,000, of which £8000 has been issued and paid-up. Ordinary shares of the Ammanford Company are to be issued to the shareholders in the Garnant Company in the proportion of £120 for £100 of shares in the latter. The Ammanford Company are forthwith to pay, satisfy, and discharge all debts, liabilities, obligations, and engagements of the Garnant Company. The provisions in the Act include a calorific standard of 500 B.Th.U.; and the minimum pressure is fixed at 15-10ths. The Company are empowered to raise additional capital to an amount not exceeding in the whole £42,000. The dividend is limited to 8 p.ct. in respect of ordinary capital, and 7 p.ct. in respect of such part as is issued as preference capital. The borrowing powers allowed are equal to one-half the paid-up capital. The area of supply is extended so as to include the hamlet of Loughor. The maximum price is increased from 4s. 3d. to 6s. per 1000 c.ft. Under section 52 of the Act of 1909, the Ammanford District Council have power to apply to Parliament for authorization to purchase the undertaking. The power is now amended so that the Ammanford Council will have to give the Cwmamman District Council six months' previous notice in writing of their intention to apply to Parliament for the purpose. If within three months of the service of such notice the Cwmamman Council notify in writing to the Ammanford Council their desire to purchase the undertaking jointly with the Ammanford Council, then the two Councils are in the next available session of Parliament to introduce and promote jointly a Bill for the constitution of a Gas Board. If within twenty-one years of the passing of the Act of 1909, the Ammanford Council do not give notice to the Cwmamman Council, the Council may serve on the Ammanford Council notice in writing of their desire to purchase the undertaking of the Company; and if, within three months of the receipt of the notice, the Ammanford Council do not serve on the Cwmamman Council notice in writing of their intention to join in promoting a Bill, the Cwmamman Council may proceed to promote one to give effect to the purchase. The provisions of the section are only to apply to the two Councils respectively so long as any part of the undertaking of the Ammanford Company is situate within their respective districts. [*Parliamentary Agents: Messrs. Baker & Sons.*]

The Bill of the Swinton and Mexborough Gas Board is interesting in view of the fact that it principally refers to the purchase of coke-oven or other waste gas from the Manvers Main Colliery or other collieries in the neighbourhood. The clauses confer power to make contracts and agreements for the purchase and supply of gas and coke-oven gas within the limits of supply of the Board and the urban district of Wath-upon-Dearne and the parish or township of Brampton Bierlow in the rural district of Rotherham. Authorization is given as to the laying of all necessary mains. But the Board are not to lay any mains, pipes, or culverts under the present powers within the limits of supply of the Wath, Bolton, and Thurnscoe Gas Board after the expiration of fifteen years from the passing of the Act. But this is not to prevent the Board repairing, altering, renewing, or removing any conveying plant which may have been laid before the expiration of the period. Power reposes in the Board of Trade to grant an extension of the period. Independently of other financial powers, the Board may borrow £2500 for the laying of mains for the conveyance of coke-oven gas; the money to be repayable in thirty years. Protective clauses are given to various local authorities and railway companies. In provisions for the protection of the Wath-upon-Dearne District Council, is one which is much too open. It is that "the Council shall not be liable for, or in respect of, any damage or injury to any apparatus or other property of the Board arising from the ordinary use by the Council of a steam or other roller or traction engine." No weight of steam-roller or traction engine is specified. [*Parliamentary Agents: Messrs. Baker & Sons.*]

Temporary Increase of Charges Act.—Orders have been issued by the Ministry of Health, under the Statutory Undertakings (Temporary Increase of Charges) Act, authorizing the Abergavenny Corporation to increase the maximum price of gas from 5s. 10d. to 6s. 6d. per 1000 c.ft. (Second Order), and the Holme Cultram Urban District Council from 5s. 6d. to 5s. 10d. per 1000 c.ft., subject to rebate.

Carolene Gas.—A new gas, to take the place of acetylene in blow-pipe work, has been produced in America. It is called carolene, and, according to the "Engineer," has a value of 1580 B.Th.U. per c.ft. The composition is 84 p.ct. carbon and 14 p.ct. hydrogen; and as the gas may be safely stored in unpacked cylinders at a pressure of 3500 lbs. per square inch, considerable saving in weight can be effected. The maximum temperature obtainable is stated as 6200° Fahr.

ELECTRICITY SUPPLY MEMORANDA.

The supply of electricity to artizan's dwellings, and especially in the new housing schemes, is still a matter that is worrying our electrical friends. They have good ground for worrying if they wish to get this business, because they know that the cost of installation is in excess of that of a gas installation, that the cost of appliances is more than those for gas, that the range of useful application is less, that the overall operating, maintenance, and renewal costs are more, and that for essential domestic purposes electricity is out of the running for time economy. There has been a discussion on the subject before the Institution of Electrical Engineers, which was stimulated by a paper read by Mr. Leonard Milne. From the paper and the discussion, it is quite clear that the electrical industry fully appreciates the limitations which cost and slow operation involve for various domestic purposes. So, obviously, there are some of its highly speculative counsellors who would have electricity undertakings spend a large amount of money in getting hold of the business of supplying artizans' dwellings, apparently even if it does not pay so well as other branches of business. Mr. J. W. Beauchamp, the Director of the Electrical Development Association, for example, urges that "even if there is difficulty in getting in heating and cooking, they should be prepared to spend a good deal of money to get electric light into these workmen's dwellings." And another speaker at the same meeting—Mr. H. J. Cash—thought that if electric wiring must be got into artizans' dwellings at all costs, it would be far better to spend large sums on installation than on propaganda, which strikes us as being a nasty smack at Mr. Beauchamp and the Development Association. But this all goes to show what electricians feel they will have to do to get business in artizans' houses—not that, with capital, maintenance and renewal charges, work involved, and low revenue, it would be much to their gain. But it seems that electrical contractors would benefit most. Mr. Beauchamp dangled an attractive bait before them. "Assuming that only a quarter of a million of the proposed houses were within the reach of electricity supply, this would," he said, "mean about 2½ millions of money for electrical contractors, while the supply of energy, lamp renewals, &c., must also represent very large business." But it is all highly problematical as to what is going to happen, so far as the tenants of these houses are concerned. In a phrase laden with uncertainty, Mr. Beauchamp remarked: "As time went on, they would probably get simpler tariffs, cheaper cooker apparatus, and the meter problem would be solved partly by twenty-four hour supply, and partly by the use of waste heat from the generating stations." "Probably" stands out with marked relief from the rest of the words composing that statement.

Anxiety over the Housing Schemes.

The real point of all this is that the costs of electric installation are frightening those responsible for the development of the housing schemes. So our electrical friends are looking round to see how they can economize. They propose to do this by schemes of wiring that they would not dare to put into better class houses, and by fixed prices instead of meters. But all this produces fresh trouble. Exposed wiring ought not to be permitted in houses occupied by the working class. It is all very well to ridicule this; ridicule is not a reply to, nor any protection against, the asserted danger. We repeat what we have said before, that the strongest and best equipment is an essential in such houses. Some electrical engineers appreciate this; others allow the need of economy, if business is to be done in this direction, to obfuscate the obvious danger. Mr. Milne says it seems that some form of uncased cleat wiring must be used on the grounds of economy. He quotes prices for a nine-light installation in screwed enamelled welded tube, including main switch and main fuses, distribution board, plain fittings, lamps, and switches at £19 13s. 8d.; in close joint conduit with continuity fittings, £14 1s.; in wood casing, £16 3s.; or with the wires on porcelain cleats, and unprotected except where they rise through floors and pass through walls, £11 4s. 8d. To further save cost, he suggests bare overhead wires carried on insulators attached to the chimneys—the supply entering at the top of the house, and the supply authority's apparatus fixed on the upper and not the ground floor. This would add to the labour of inspection. For the installation he proposes the use of a twin wire, made up with one core of No. 20 S.W.G., insulated to 600-megohm grade, with bare No. 20 S.W.G. laid in long spirals around this, and the whole braided. Such a twin conductor, he says, would save some 50 p.ct. in the cost of wire, and is amply large enough to carry the current required at a pressure of not less than 200 volts. The total result of the economies he suggests would be that the cost of a nine-light installation would amount to £7. The question is how long would an installation of the kind last in such places before renewal is required.

To Reduce Installation Costs.

There is the meter difficulty. Opinion is very largely divided in the electricity industry on this subject. Some think fixed prices are sufficient; others know they are not. And it is more important than ever that, under the fixed

Meters and Fixed Prices.

price system, with electric current at the charges of to-day, there should be no extravagance in use. Extravagance in use grows, and does not diminish. Mr. Milne acknowledges this extravagance, as well as the dishonest use of lighting points for electric kettles, irons, and all the various apparatus which can be utilized with a lamp socket adaptor. Mr. Milne instances two small towns of similar character in which the fixed price has been tried. In one the average annual consumption worked out to 31 units per 40-watt lamp installed; in the other, to 46 units. It was found on investigation that a number of kettles and irons (the current for which was not paid for) were in use. Mr. Milne's only suggestion to avoid this fraudulent use is to instal one meter for every dozen or twenty houses; charge a fixed rental sufficient to cover the most extravagant use of current for lighting purposes; and allow a quarterly rebate to each consumer when the meter shows a consumption below the predetermined estimated figure. As the extravagant ones would enjoy the rebate equally with those who practised the most rigid economy, the latter would be penalized owing to the malfeasance of the former. Mr. Milne also looks into the questions of cooking, heating, and hot water supply by electrical means in artizans' dwellings. He is suggestive, but obviously not very hopeful.

The Denial. As intimated last week, just in the midst of the Easter holidays we received a copy of the reply of the Electric Lamp Manufacturers' Association to the report on the electric lamp industry prepared by the Sub-Committee of the Standing Committee on Trusts. Literally interpreted, the report tells us that, whatever the members did before the war in the way of high profit making, they are only extracting from the public half the amount of profits that they were doing then; so that they stand before the world blameless in this respect, and have been very unfairly dealt with by the Sub-Committee. In fact, the Association have been very good to the public. While the prices of commodities have risen by 125 p.ct., the prices of vacuum standard lamps have only been increased by 26 p.ct.; and, of course, a higher retail price could have been secured had it not been for the Association. The Sub-Committee admitted that the average profits of the associated firms per standard lamp dropped from 9·5d. in 1913 to 4·7d. in 1919—the average price received by the manufacturers per lamp being 20·6d. in 1913, and 25·9d. in 1919. The total of the factory and selling costs in 1913 averaged per lamp 11·1d.; and last year 21·2d.; so that the difference of 4·7d. between the 21·2d. and the average price received by the manufacturers (25·9d.) is rather more than 20 p.ct. on the total factory and selling costs. In other words, in spite of greatly increased costs of production, the associated manufacturers' prices have only risen about one fifth as much as the general rise of retail prices, while the rate of profit has decreased by about 50 p.ct. This all goes to show that, before the war, the prices charged for the lamps were exorbitant and very fruitful in profit. Between 1907 and 1913, the average retail price of high voltage lamps dropped from 6s. to 2s. 8d. The average retail price is now 3s. 6d. Between 1907 and 1913, the retail price of low-voltage lamps dropped from 4s. to 2s. 2d.; and it is now 3s.

Trading Arrangements, and Manufacturing Licences. As to trading arrangements, the Committee assert that the average discount in the lamp trade to-day is not higher than the average discount on other electrical supplies. The Sub-Committee suggested that the practice of the Association was to make every trader whose net purchases entitle him to a discount of 30 p.ct. or more sign the factors' agreement, the particular feature of which is that the trader agrees not to sell other than Association makes of lamps. Upon this, the Association state that no trader signs this agreement. It is only signed by factors who are in effect exclusive agents for Association lamps; and there are only 54 factors who have signed the agreement. No other agreement is entered into which forbids the sale of non-Association lamps; and there is nothing to prevent a trader buying non-Association lamps and selling them cheaper than the associated firms' lamps. This is tantamount to suggesting that the retailers use the Association prices to increase their own profit on non-association lamps. It would be interesting to know whence came the evidence and its nature which led the Sub-Committee to make statements that are now alleged to be erroneous, or to require substantial qualification. The Association make a very fair defence as to manufacturing licences. They were charged with having imposed onerous conditions upon other firms in respect of the limitation of output in regard to licences granted under the patent rights of the associated firms, and stipulations that the validity of their patents should not be disputed. The Association point out that their business is mainly founded upon their patent rights. They have a legal monopoly, and are not bound to grant licences. There is, therefore, it is submitted, nothing unreasonable in the owners of patents imposing upon those to whom a licence is granted conditions as to the amount of their production, and as to the admission of the validity of the patent rights. The firms constituting the Association had at command, at the time the Association came into existence, sufficient resources to build factories big enough to meet the demands of the country; and their patents had stood the test of litigation through the House of Lords. They did not take steps to make their own output equal to the demand. On the contrary, licences were offered to all the existing manufacturers. This policy, it is contended, proves that the founders of the Association had no desire to cripple, but rather wished to strengthen, the lamp industry of the country.

The Dutch Bargain. One of the cardinal charges in the report of the Sub-Committee was that the Association had bought 1¼ million half-watt lamps from Holland at 3s., and retailed them in this country at 12s. 6d. This was a point dealt with in the "Memoranda" last week, when it was shown that the larger part of the lamps were sold to the Government and some important establishments where arc lamps had to be replaced owing to the scarcity of carbons and labour. Some 97 to 98 p.ct. of the lamps went to large consumers at a price of about 8s. 3d., which is approximately the Sub-Committee's idea of what the price should have been. Thus the £280,000 profit alleged to have been taken in excess from the public by the importers and distributors is the outcome of the imagination of some calculator who was not aware of the actual facts. Moreover, it now appears that the importation of these lamps was the result of a bargain to obtain the assistance of a Dutch competing firm in building an argon plant in this country during the war—argon being the rare gas used in the half-watt type of lamps.

General Considerations. Later in their comment upon the report, the associated firms point to the large expenditure upon plant, and its reorganization as new developments were made. There are, of course, many and heavy risks connected with the starting of a new industry based on patents. Experiment, research, purchase of patents, training, return of goods that were faulty at the beginning through lack of skill and experience, costs of experts and patent litigation, and other expense have all had to be borne by the three patent-owning firms. It is learned that in this country the total lamp turnover of the associated firms to-day is only £3,000,000 per annum, or, after allowing the charges of the distribution trade, an average of 1s. 9d. per head of population. What the firms have spent in research alone during the last eleven years is shown by the following extract from a letter which the Association addressed to the Sub-Committee: "The total sum expended only on lamp research amounts approximately to £364,000, with a present annual approximate expenditure of £50,000." The Sub-Committee, it is stated, specifically omit these figures, and allege that they have no means of knowing how much of the research expenditure has been devoted to lamps.

Harmful Methods. In concluding the comments, the associated firms deal with a matter which is described as being of "national importance." We will let the remarks in this connection stand as presented: "The Committee, who seem to have been deliberately chosen for their lack of knowledge of the electrical industry (presumably in order to secure impartial judgment) held only nine sittings. In this short time, they attempted to take, to consider, and to report upon evidence in minute detail upon a large and complicated subject. It can hardly be wondered that in such haste they have ignored the economic position of the industry in the national life and the necessity of safeguarding a vital 'key' industry to the nation. It is suggested that this larger question should have been at least more fully recognized in making a report which will be considered by all competing lamp manufacturers in foreign markets, as well as by the home consumer. Ill-considered judgments of this kind when issued under the authority and direction of a Government department cannot fail to have the most mischievous results." This shows that the associated firms do not agree with the statement of the "Electrical Review" that "although the members of the Sub-Committee which carried out the inquiry are practically unknown in electrical circles, they appear to have acquired a thorough grasp of the subject; and, while the report is not free from mistakes, it is on the whole a very able, impartial, and judicial pronouncement."

German Association of Gas and Water Engineers.—A preliminary announcement states that the sixty-first annual general meeting of the Association will be held on Thursday and Friday, June 17 and 18, at Harzburg, under the presidency of Herr E. Körting, of Berlin. The list of papers to be presented will be issued later. It is intended to have, in connection with the meeting, an exhibition of novelties in gas manufacture, works control, distribution, and the use of gas. The arrangements for this exhibition are in the hands of Herr Lepsien of the Constructional Staff of the Corporation of Brunswick.

New England Association of Gas Engineers.—The reports of proceedings at the 1917, 1918, and 1919 meetings of the Association have been bound up in one volume, a copy of which is just to hand. The matter and illustrations occupy 450 pages; and the volume altogether is proof of the activity of Gas Association work in the United States. Some twenty papers and discussions are recorded, besides the reports of various Committees. There are portraits of the Presidents for the three years, who were respectively, for the forty-seventh, forty-eighth, and forty-ninth meetings, Mr. H. C. Crafts, Dr. J. F. Wing, and Mr. J. Arnold Norcross.

THE BUILDING TRADES EXHIBITION.

There have been building exhibitions extending over the past twenty-five years; but the series had, of course, to be suspended during the war. Now, for the first-time since 1913, Olympia is again given over to a display of materials and goods of all kinds appertaining to the building trades; and the whole of the lettable space in the great building has been allotted. The exhibition generally is quite a good one; and gas—as it should be on such an occasion—is fairly represented. There is also a good show of road-making substances and spraying machines, reinforced concrete systems, and some air-gas systems. Several of the stands are necessarily very similar in character to those of the same firms at the recent Ideal Home Exhibition*; and to that extent, of course, it is unnecessary to notice them again in detail on this occasion.

Gas Fires, Cookers, and Water Heaters.

In a commanding position near the entrance is a big stand in square formation, divided into four sections, which are devoted respectively to the goods of Messrs. Arden Hill & Co., the Davis Gas-Stove Company, Ltd., the Richmond Gas-Stove and Meter Company, Ltd., and Messrs. John Wright & Co., Ltd. In all cases the exhibits have been well selected, special attention being drawn to apparatus suitable for use in connection with the projected housing schemes.

Arden Hill & Co.

Glancing first at Messrs. Arden Hill & Co.'s display, there is the "Acmefont" builder's set, a combined gas-heated hot-water circulator and storage tank, with which the gas consumption is automatically controlled and economized. When full-on the consumption is 40 c.ft. per hour maximum; but when the water reaches the temperature to which the thermostat is set, this is reduced to 5 c.ft. per hour. The "Economy" valve, with the two return connections at the cylinder, is a source of marked economy, and is, of course, a great convenience, by giving the storage tank two capacities to meet the two widely different domestic requirements—bath water and other purposes. The dual return connection, with the "Economy" valve open, allows of 20 gallons being heated for baths; but at other times, with the valve closed, 6 gallons only are in circulation. Starting all cold, a hot bath is obtainable in from 40 to 50 minutes, and a second bath in less time. Dish-washing water (with the "Economy" valve closed) is heated at the rate of 18 c.ft. of gas for 6 gallons.

Among cookers, there are the "Super-Acme" and "Brownie;" the latter being specially suitable for use where space is limited, or where the requirements of the family are small. The new "All Cast" wash-house boiler, which is perfectly rustless, is being supplied in large quantities. The outer case is of cast iron, and the pan is of the same material. It has a wooden lid, which can be removed to give complete access to the boiler all round. There are various patterns of fires, with patent injector-ventilating action, and silent burners, including the "Gnome," "Olak," and "Urban," suitable for housing schemes. The effect of this ventilating action is to change the atmosphere of the room completely a number of times per hour—in some cases as often as six times. The "Frame" gas-fire, with the latest improvements, is for use in situations where the comfort of a gas-fire is desired, without interfering with an existing design of coal grate. In the way of gas-steam radiators, there is the "Mars," a self-contained and economical apparatus.

The Davis Gas-Stove Company.

Specially designed, for use in national housing schemes, there is the Davis "N.H." interior (an inexpensive gas-fire with high-grade features), a sample of which is included in the exhibit of approved national housing appliances by the Building Material Supplies Department of the Ministry. With fittings of the best, this fire has been specially priced to compete successfully with the cheap conventional mantle-register coal-grate. The initial adoption of this interior, of course, enables coal-fire flues and chimney breasts to be done away with, and the "Nautilus" gas-fire flue to be substituted, with substantial resultant economy in building costs. The front casting of the "N.H." interior has been made readily removable by screw fixing, to permit of brick repairs or replacements without any interference with the setting of the fire. Other gas-fires, with very handsome surrounds, are the "Standen" and "Jacobean." The "Gascol" is a convertible gas and coal range; and there are also "New Davis" and other gas-cookers. A selection is on view of gas-heated steamless radiators.

A feature is made of a working display of geysers and hot-water apparatus, rendered possible by the fact that gas and water are laid on. By the way, the excellent plumbing work to be seen here has been much remarked upon by visitors. The Davis "Auto-Economic" gas-heated circulator, with thermostat, has for its principal function to furnish, through a storage system, a ready and adequate supply of hot water for domestic purposes at any time during the day or night, when the kitchen range is not in use. It also operates effectively and economically in conjunction with the kitchen range boiler—supplementing the latter's water-heating capacity to the required extent when the hot-water supply would not otherwise be sufficient. It can be used in connection with its own independent storage tank, or it may be connected to an existing system, in which case the same storage tank serves both for the boiler heated by the coal-range and for the gas-heated circulator. This form of construction results in great efficiency; and the internal parts are readily accessible. There are various geysers—including the "Perfecta" sealed type, which is very suitable for use with hard water, because it can be easily taken to pieces for the removal of deposits. The "Midget" lavatory geyser is also of the sealed type, and particularly attractive appearance. The outer casing and cover are of aluminium, polished and lacquered; the body being mounted upon a white porcelain enamelled base-plate and bracket.

* See "Journal" for Feb. 10 last, p. 298.

Richmond Gas-Stove and Meter Company.

"Bungalow" cookers have been specially designed to meet present-day requirements, and are now made in five sizes. The "Bungalow" is placed on a stand with a white enamelled top, which presents a hygienic appearance, secures a suitable working height, prevents floor draught interfering with the burners in the oven, and materially assists in increasing the heat. The hot-plate (where the greatest percentage of work is concentrated) has been carefully planned; the burners being so placed as to prevent the utensils overlapping. Hence the utmost efficiency is obtained without waste of gas. In addition, there is a patent grill —*i.e.*, by raising or lowering, it can be used for grilling or boiling as desired. The taps are placed in front, which offers facilities when operating, and enables the cookers to be placed in a narrower space.

The "Economic" and "Blackpool" wash-boilers can be provided with a connection for the supply to a bath, where this is on the same level. They are fitted with galvanized sheet-metal outer casing and rustless cast-iron or copper pan. Special attention may be directed to the "Lyn" boiler, which is simple in design, while at the same time efficient. The gas consumption to maintain the full capacity of boiling water is infinitesimal, as the boiler is fitted with an automatic thermostat valve which effectively controls the gas supply. The "Lyn" (which is for fitting over the scullery sink or lavatory basin) is intended to supply hot water during the summer months, when coal-ranges are not in action; and it is always full of water, so that it cannot be damaged by carelessness. It is constructed of copper, with tinned interior to prevent rust; and the exterior is art bronze finished.

The "Ironclad" circulator is to supply hot water to any part of the house, and can be connected to existing flow-and-return pipes from coal-ranges. The chief feature is accessibility to the interior, which can quite easily be thoroughly cleaned out, thus always keeping the heater up to maximum efficiency. The firm are also showing an alternative circulator known as the "Equator," which is designed for the same purpose as the "Ironclad;" but in this case the cylinder and heater are combined so that the apparatus is suitable for houses where it is not convenient to fix a hot-water cylinder. Here, again, the subject of cleaning the interior has been provided for by removing the lid on the top of the heater or the manbole at the side. There is a series of geysers, both open and closed types. The efficiency of these geysers is very high, and the cost of maintenance low, as accessibility has been carefully considered. They are particularly useful in localities where water contains a high percentage of lime and other scale-forming properties. By simply lifting three lids, the water-ways and gas-heating ways are exposed for thorough cleaning. The patent telescopic flue calls for special mention, inasmuch as, in the event of any cleaning of the interior of geysers becoming necessary, this flue obviates any possibility of damage to bath-room decorations. It is made of three parts, and enables incrustation to be easily removed.

There is the latest "R.H.D." fire, which has an extended circular front; the object being to diffuse the heat from the sides of the fire as well as from the front. The demand has proved that this design is appreciated. Examples of the "Period" series of fires are also shown. For heating entrance-halls, there are gas-steam radiators, and hygienic condensing stoves.

John Wright & Co.

One of the main features of the exhibit is the new "Eagle" gas-range. This has been designed (with various points of departure from previous custom) so as to ensure that every possible heat unit from the flame is allowed to concentrate on the vessel above. The burners are specially constructed to give a maximum range of duty and to secure all possible economy in gas consumption. Some of the burners are on the duplex principle; and an extension piece can be attached to either or both sides of the hot-plate. There are points about the oven also which make for efficiency and economy, and various other characteristics attaching to the cooker making for higher efficiencies, which have already been emphasized in the columns of the "Journal."

The "B.Tb.U." circulator and storage-tank set, with gas consumption controlled and economized by a patent automatic positive-acting thermostat and an "economy" valve, possesses advantages of compactness, convenience, &c., which render it particularly suitable for workmen's dwellings and business places, where space is limited and labour must be minimized. Easy access to remove deposits is provided for; and the tank is supplied in four sizes. When required for hard-water districts, the internal metal parts are treated with "Antiscale" protection. This enables lime deposit to be removed without detriment to the apparatus. For soft water areas "Bower-Barffing" prevents corrosion of the internal metal parts. The storage tank may also be made of copper. With

the special valve and connection arrangements, only on the few occasions when baths are required is the full capacity of the apparatus put into circulation. The "Novo" wash-house boiler, with cast-iron outer case and pan, is more durable than galvanized iron; and the pan is "Bower-Barffed" as a protection against rust. A surrounding ridge keeps water from running over on to the floor. There are no corners or ledges for dust to settle on, and no sharp edges to injure the hands or clothes.

Fires are represented by the handsome "Kenilworth" pattern, and by the "Swastika" series of injector-ventilating fires. The St. Andrew gas-heated steam radiator is also included.

South Metropolitan Gas Company.

In these servantless days, the overworked housewife who visits the Exhibition will be interested in the display in the gallery of the South Metropolitan Gas Company, which is designed to show the labour-saving capabilities of gas in a small home. The great thing is, of course, the avoidance of the work of handling, burning, and cleaning-up the inevitable ash and dirt of solid fuel; but beyond this there are conveniences.

There are four rooms tastefully furnished, and lighted throughout by "Metro" burners on very chaste fittings. In the kitchen-scullery, there is an ordinary gas-cooker connected with a gas-circulator, which is supplying a bath, lavatory basin, and sink. Gas-irons and a plentiful supply of suitable literature complete the equipment here. The living-room is provided with a "Metro" fire, with a pilot lighter at the side. The gas-lights are controlled by pneumatic switches. The "Metro" lighting is arranged to demonstrate the suitability of gas for rooms with low ceilings, and the ventilating arrangements are worth notice. Another "Metro" gas-fire, but this time with a boiling-burner at the side, is in the bed-room. Then there is a bathroom, with a small geyser, and the hot-water laid on from the circulator in the kitchen.

In the Official Guide to the Exhibition, the South Metropolitan Gas Company are able to make the highly significant announcement that of the 1296 houses built by H.M. Office of Works in Well Hall, London, S.E., 1286 use gas only, 9 gas and electricity, and 1 electricity only.

"Novoid" and Other Specialities.

Those concerned with building construction of any kind will find much to interest them in the display made by the Torbay and Dart Paint Company, Ltd., of No. 26, Billiter Street, E.C., of waterproofing, weather-proofing, and other materials. There is a small motor-car house built of solid clinker concrete blocks, faced upon both the inside and outside faces with their "Novoided" cement rendering in a buff tint, which was applied while forming the blocks in a block machine, thus making the blocks perfectly weatherproof when built into the walls. All the timber in the roofs, door, &c., has been treated with their flame-proof stain "Quelle," and the inside walls with "Rencrete," which the firm make in suitable tints, more especially for use as a weatherproofing upon outside walls. They have also various building materials such as fibre boards, composition boards, and fly boards, plaster slabs, and concrete slabs, coated with "Quelle," "Rencrete," and "Everok"—the last named being a colourless solution for weatherproofing exterior walls where "Rencrete" would not be suitable. They show many shades of "Aurora" distemper, which is really washable within one week of being applied. Among recent work upon which these products have been used is a basement, wholly below the ground level, that was always flooded and unusable in the winter, at the Hampstead Brewery. The walls were treated with "Everok" and "Rencrete," and the floor rendered with portland cement and sand, with 14 p.ct. of "Novoid" added to the cement. This was successful in keeping the cellar dry. An incident in this work proved the effect of "Novoid." It became necessary to cut through the floor to an old sump below for pumping purposes. When the workmen cut out the "Novoided" concrete, water spurted through the vent to a height of about 3 ft., thus showing the water pressure the floor was resisting.

No doubt, the feature of the exhibit which will make most particular appeal to gas engineers is a series of clinker concrete tanks, rendered inside with portland cement and sand, with a percentage of "Novoid" added—the "Novoid," it may be explained, which is the principal manufacture of the Company, being a powder which chemically acts upon portland cement, and renders concrete weather, water, and oil proof by filling the voids with insoluble silicates. "Novoid" can be used to make acid-resisting concrete; and the various tanks contain, among other liquids, tar and ammoniacal liquor from gas-works and sulphuric acid. There is a model of a sulphate of ammonia container in "Acid Novoid" concrete; and attention is drawn to the low cost of this, as compared with a lead lining. Exactly what is effected by mixing "Novoid" with concrete is shown by a series of photomicrographs of plain portland cement and a mixture of "Novoid" and portland cement. With the cement alone, the voids are clearly seen; and the filling of these is proved to have followed the introduction of 7 p.ct. of "Novoid"—the claim of this material to increase strength, in addition to its other qualities, being thus understood. Experiments have demonstrated an increase of 80 p.ct. in the compression value of concrete by adding "Novoid," as well as a higher tensile figure.

Potterton Gas-Boilers.

A selection of "Victor" gas-boilers, with other of their well-known water-heating apparatus, can be inspected at the stand of Mr. Thomas Potterton, of Ravenswood Road, Balham. There are also both water-controlled and air-controlled thermostats in operation.

A main feature of this exhibit is a small-capacity plant specially designed for use in connection with the London County Council housing scheme. What this apparatus will accomplish can be seen from the figures reproduced below, which refer to a test made under careful supervision. Working-out the cost at the prevailing slot-meter rate (which is, of course, more than would be the case with an ordinary meter—*i.e.*, 16⅔ c.ft. for a penny), this test shows that a good bath can be obtained at an outlay coming within 2d., under present high rates; and there is a small reserve left afterwards for other purposes. With the use of the patent cut-out valve 3 gallons are heated before the thermostat operates; this being intended to meet the demand for ordinary domestic use when baths are not required. It should be noted that the temperature of this small supply will be between 140° and 150° Fahr., according to the temperature of the cold water. A point made is that with this apparatus high-temperature water in small quantities is available immediately, without successive re-heating. The plant in question has been fitted to the order of the South Metropolitan Gas Company, as a sample installation for the small tenements housing schemes. This particular block, as already stated, is one of the London County Council dwellings; and it is hoped that the apparatus will be adopted for their new buildings.

Report of a Test made of No. 50 Potterton's "Victor" Gas-Heated Hot Water Apparatus at L.C.C. Buildings, Webber Row, Waterloo March 30, 1920.

Initial temperature of water	51° Fahr.
Gas lighted, 2.59 p.m., meter index	00181 c.ft.
Gas out, 3.44 p.m., " "	00213 "
Time, 45 min., consumption	32 "
Water drawn in bath	3.44 p.m.
Highest temperature	148°
4½ in. deep in bath	133°
5 " " "	130°
6 " " "	118°
7 " " "	110°

The cost of gas consumed would represent 2d. at slot-meter rate.

The water supplied covers the requirements of all household demands, whether for culinary requirements or bathing.

Ewart & Son.

A large show of geysers is made by Messrs. Ewart & Son, Ltd. of Euston Road; but the exhibit calling for special mention is the "Industria" water-heater, which has been designed specially to meet the demand for inexpensive water-heaters for new housing schemes requiring a hot-water supply to bath and sink, when both are on the same floor. It is a gravity heater, so arranged that, while the main part of the apparatus contains 15 gallons, and requires about 25 minutes to heat sufficient water for a bath, a small subsidiary boiler is fitted that will heat about 1 gallon to practically boiling-point in about 5 minutes. A point about the appliance is that it costs very little to instal. To save cleaning, the outside is enamelled.

Other Exhibits.

Messrs. M'Dowall, Steven, and Co., Ltd., exhibit (among other cooking and heating specialities) their "Combyn" coal and gas fire. The "Hurry" Water-Heater Company have their gas water-heating appliances of various patterns, as well as a gas-copper for boiling clothes and for delivering hot water to a bath fitted on the ground floor. At the stand of the Aerograph Company, Ltd., paint-spraying can be seen in operation. The Staines Kitchen Equipment Company include samples of "Ajax" geysers. There are ventilating fans by the Sturtevant Engineering Company, Ltd. The "Solignum" wood-preserving stain of Messrs. Major and Co., Ltd., can be examined amid appropriate surroundings. Many specialities are to be seen at the stand of the Leeds Fire-Clay Company, Ltd. Also at that of Holophane, Ltd., where there is a new design of reflector-refractor for interior lighting, employing a combination of reflective and refracting properties. The street-lighting refractors consist of a special two-piece enclosing bowl designed to give extreme lateral light distribution. There is a smooth surface both inside and outside, so as to facilitate cleaning.

The Carron Company show a few gas-fires. Messrs. Jenkins and Co., Ltd., draw attention to a smokeless boiler stove and gas or electric cooker combined. The waste heat from the boiler fire travels round the cooker, in order to reduce the quantity of gas or electricity needed for maintaining a cooking heat. General Trading and Manufacturers, Ltd., exhibit the "Ventiheater," on behalf of which various claims are advanced, including a very small gas consumption, an effective ventilating effect without any draught, and absence of intricate working parts. Gas appliances are also to be found on one or two other stands.

Encouragement of Industrial Research.—The Secretary of the Department of Scientific and Industrial Research announces that a licence, under section 20 of the Companies' (Consolidation) Act, 1908, has been issued by the Board of Trade to the Scottish Shale Oil Scientific and Industrial Research Association, which has been approved by the Department as complying with the conditions laid down in the Government scheme for the encouragement of industrial research. The Association may be approached through Mr. W. Fraser, C.B.E., Scottish Oils, Ltd., No. 135, Buchanan Street, Glasgow.

NEW "UKAY" INVERTED LAMP.

There are many uses for such a lamp as the new "Ukay," which is a development of the original lamp of the same name introduced some ten years ago by Messrs. Falk, Stadelmann, & Co., of Farringdon Road, E.C., to meet outdoor lighting requirements.

Perhaps the first point to strike one is the durable character of the lamp; the burner parts and the whole of the interior metal fitments, together with the hinge and bolt, being substantially made from brass castings or brass roddings. The casing, in enamelled steel or copper, is wind and rain proof; and the maintenance standpoint has been appropriately considered in the extremely simple construction throughout.

The lamp has been designed to secure the highest possible flame temperature at ordinary pressures. The bunsen tube is of the straight-down type, centrally through the lamp; and it is connected to a heavy cast brass superheater, to which the mantle nozzles [for various sizes of mantles, as desired] are attached, so that the mixture reaches the point of combustion in a highly preheated condition. All the burners are simultaneously adjusted by one gas-and-air regulator, operated from the outside of the lamp by a loose key, which can be removed to prevent subsequent interference. A feature of the lamp is the gas-adjuster, which is quite distinctive; the gas-passage being in the form of a slot, opened or closed by rotating the regulating screw. There is no needle-valve or small hole to choke-up the free gas-way; any foreign substance carried forward by the gas being easily cleared by the pressure of the adjusting screw when turned tight. The white enamelled reflecting surfaces are of correctly designed contour to give the most effective distribution of light.

There are other points about the lamp; but sufficient has been said to justify its claim to consideration.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Annual General Meeting.

The Annual Meeting of the Association was held on Saturday at the Grosvenor Hotel, Manchester.

Annual Report and Accounts.

The Hon. Secretary (Mr. J. Alsop) presented the report, which showed that the membership had remained as last year. The work of the Education Sub-Committee was reported up to the date of the meeting. Their work, however, is not finished; and it is hoped that in the near future a definite scheme will be submitted. The prize offered by Mr. Fairhurst, of Altrincham, for the best paper read before the Association on a subject relating to the engineering side of the profession has been awarded to Mr. W. H. Postlethwaite, of Salford, for a paper on "Efficiency of Boilers and Power Distribution." Mr. T. Duxbury, of Oldham, was the Adjudicator on behalf of the Association.

The Hon. Treasurer then read the balance-sheet, which showed a balance in hand of £2 6s. 10d.

The members agreed that it was a very satisfactory report.

Mr. R. H. Garlick (Salford), a former Treasurer, offered to give a prize of from two to three guineas for the best paper during the coming session by a junior member. He hoped that this would stimulate the younger members to qualify for a higher position in future.

Election of Officers.

The following appintments were made:

Vice-President: Mr. J. B. Stewart.

Hon. Secretary: Mr. J. Alsop.

Hon. Treasurer: Mr. J. Robinson.

Auditors: Messrs. H. Goodier and F. A. Collier.

Members of Council: Messrs. W. L. Heald, J. H. Dawe, G. Dixon, C. E. Teasdale, and S. Carter.

The Council Thanked.

Mr. J. T. Haynes (Lancaster), in moving a vote of thanks to the Council for the work done during the session, suggested that visits to smaller works, where smaller items could be discussed and more time spent, would be a distinct advantage—the discussion to be of an informal character, like the Liverpool meeting which followed on after the ramble round the works. He was very much in sympathy with the education scheme; and to his mind it should be developed. The Council had spent both time and money; and the best thanks of the meeting should be given to them for helping others to better themselves.

Mr. J. H. Dawe seconded the resolution; and Mr. C. E. Teasdale replied to the vote on behalf of the Council.

The Prize Presented.

Mr. S. Tagg (Preston), at the call of the President, made the presentation to Mr. Postlethwaite of the prize for the best paper last session. Mr. Tagg said he noticed that only two contributions had been made on the engineering side; and he urged the advisability of more contributions. The members who gave them would find great benefit. The high order of the papers given in the Lancashire district was most marked; and he hoped that the prize offered that afternoon by Mr. Garlick would meet with a good response.

Mr. Postlethwaite acknowledged the presentation in suitable words, and emphasized the statement that those who gave papers obtained the most benefit.

Introduction of the New President.

Mr. W. Fletcher, the retiring President, in introducing his successor, Mr. J. Bridge, said he thought a wise choice had been made, when it was decided to elect Mr. Bridge to the office of President. They had not made quite the progress that he would have liked; but yet, when one came to look round, a decided movement had been made on one or two very important subjects, which would show later on. He thanked the Council for their help.

Mr. Bridge proposed a hearty vote of thanks to Mr. Fletcher for the excellent manner in which he had presided over the affairs of the Association during the past year. They had all felt that Mr. Fletcher would fill the position of President with credit to himself and the Association; and these expectations had been fully realized. The office had been no sinecure. Many times Mr. Fletcher had been called to attend meetings in London, &c., at considerable inconvenience and expense to himself; but nevertheless he had always responded, and given the Association of his best.

At this point a notice of motion was read relative to a proposed alteration to Rule 9.

Inaugural Address.

Mr. Bridge then delivered his Presidential Address, which will be found on pp. 82-84.

Mr. A. L. Holton (Manchester) thanked the President for his address. He had thought Mr. Bridge would have some difficulty in choosing a subject; but he had selected a very suitable one. They could easily see that the author was interested in every item.

Mr. J. M'Lusky (President of the Yorkshire Junior Gas Association) seconded the vote.

Mr. W. J. Smith, B.Sc. (Bolton), remarked how pleased he was to see his Assistant occupying the Presidential Chair. He thought the Association had made a very wise choice, as Mr. Bridge was worthy of the position. He understood that Mr. Bridge had been a member of the Association for a considerable number of years; and his position that day was no doubt due to the hard work he had put in on behalf of the Association. Mr. Bridge had chosen an excellent subject, and one which they would find very useful in the future.

The vote was carried by acclamation.

Mr. Bridge suitably replied.

High tea was then served and a social evening followed, at which the usual toasts were honoured.

Rating of Machinery.—Acting under the advice of its technical consultants, the Machinery Users' Association has redrafted its Bill for the Rating of Machinery. The essential clauses now read as follows: (1) In the construction of any enactment relating to the gross estimated rental, gross value, annual value, net annual value, rateable value, or assessable value of any hereditament for the purpose of any local rate, or of the basis or standard thereof, or of any valuation list, or of any water rate, or water rent, the word "hereditament" shall be deemed to include such machinery only as is fixed or attached to the hereditament. (2) In the case of any hereditament occupied for any trade, business, or manufacture, the expression "fixed or attached" in the preceding section shall be construed as applying to all machinery, machines, or plant in or on the hereditament for producing or transmitting first motive power or for heating or lighting such hereditament; but save as herein provided shall not apply to machines, tools, or appliances which are only so fixed that they can be removed from their place without necessitating the removal of any part of the hereditament. (3) This Act shall extend only to England and Wales, and may be cited as the Rating of Machinery Act, 1920.

Coke-Oven Accidents in America.—Statistics have been compiled for the year 1918 by Mr. Albert H. Fay, on behalf of the United States Bureau of Mines, with regard to accidents occurring in the working of 59 661 beehive coke-ovens and 8137 bye-product ovens. Reducing all the data to 300-day workers, the average fatality rate for the five-year period 1913-1917 was 1·72 per 1000; whereas for 1918 it was 2·06 per 1000. In the latter year, the fatality rate for the beehive ovens was 1·16, and for the bye-product ovens 2·84 per 1000. The non-fatal injury rates were 131·11 for the beehive ovens, and 296·06 for the bye-product ovens, per 1000 300-day workers. It appears from the tables that the number of men actually employed at coke-ovens in 1918 was 32,389—many of them, of course, for substantially more than 300 days. Reduced to this basis, the number employed figures at 35,476. Of the actual number of men employed, 16,442 were engaged on beehive ovens, and 15,947 on bye-product ovens. In the year 1917, the coal used for coking in the United States was 83,752,371 tons; there having been produced 55,606,828 tons of coke, of a value at the ovens of $298,243,017, or $5·36 per ton. The percentage yield of coal in coke was 66·4. In 1917, 1,409,320 short tons of coke were exported; and in 1918, 1,687,824 tons.

price system, with electric current at the charges of to-day, there should be no extravagance in use. Extravagance in use grows, and does not diminish. Mr. Milne acknowledges this extravagance, as well as the dishonest use of lighting points for electric kettles, irons, and all the various apparatus which can be utilized with a lamp socket adaptor. Mr. Milne instances two small towns of similar character in which the fixed price has been tried. In one the average annual consumption worked out to 31 units per 40-watt lamp installed; in the other, to 46 units. It was found on investigation that a number of kettles and irons (the current for which was not paid for) were in use. Mr. Milne's only suggestion to avoid this fraudulent use is to instal one meter for every dozen or twenty houses; charge a fixed rental sufficient to cover the most extravagant use of current for lighting purposes; and allow a quarterly rebate to each consumer when the meter shows a consumption below the predetermined estimated figure. As the extravagant ones would enjoy the rebate equally with those who practised the most rigid economy, the latter would be penalized owing to the malfeasance of the former. Mr. Milne also looks into the questions of cooking, heating, and hot water supply by electrical means in artizans' dwellings. He is suggestive, but obviously not very hopeful.

The Denial. As intimated last week, just in the midst of the Easter holidays we received a copy of the reply of the Electric Lamp Manufacturers' Association to the report on the electric lamp industry prepared by the Sub-Committee of the Standing Committee on Trusts. Literally interpreted, the report tells us that, whatever the members did before the war in the way of high profit making, they are only extracting from the public half the amount of profits that they were doing then; so that they stand before the world blameless in this respect, and have been very unfairly dealt with by the Sub-Committee. In fact, the Association have been very good to the public. While the prices of commodities have risen by 125 p.ct., the prices of vacuum standard lamps have only been increased by 26 p.ct.; and, of course, a higher retail price could have been secured had it not been for the Association. The Sub-Committee admitted that the average profits of the associated firms per standard lamp dropped from 9·5d. in 1913 to 4·7d. in 1919—the average price received by the manufacturers per lamp being 20·6d. in 1913, and 25·9d. in 1919. The total of the factory and selling costs in 1913 averaged per lamp 11·1d.; and last year 21·2d.; so that the difference of 4·7d. between the 21·2d. and the average price received by the manufacturers (25·9d.) is rather more than 20 p.ct. on the total factory and selling costs. In other words, in spite of greatly increased costs of production, the associated manufacturers' prices have only risen about one fifth as much as the general rise of retail prices, while the rate of profit has decreased by about 50 p.ct. This all goes to show that, before the war, the prices charged for the lamps were exorbitant and very fruitful in profit. Between 1907 and 1913, the average retail price of high voltage lamps dropped from 6s. to 2s. 8d. The average retail price is now 3s. 6d. Between 1907 and 1913, the retail price of low-voltage lamps dropped from 4s. to 2s. 2d.; and it is now 3s.

Trading Arrangements, and Manufacturing Licences. As to trading arrangements, the Committee assert that the average discount in the lamp trade to-day is not higher than the average discount on other electrical supplies. The Sub-Committee suggested that the practice of the Association was to make every trader whose net purchases entitle him to a discount of 30 p.ct. or more sign the factors' agreement, the particular feature of which is that the trader agrees not to sell other than Association makes of lamps. Upon this, the Association state that no trader signs this agreement. It is only signed by factors who are in effect exclusive agents for Association lamps; and there are only 54 factors who have signed the agreement. No other agreement is entered into which forbids the sale of non-Association lamps; and there is nothing to prevent a trader buying non-Association lamps and selling them cheaper than the associated firms' lamps. This is tantamount to suggesting that the retailers use the Association prices to increase their own profit on non-association lamps. It would be interesting to know whence came the evidence and its nature which led the Sub-Committee to make statements that are now alleged to be erroneous, or to require substantial qualification. The Association make a very fair defence as to manufacturing licences. They were charged with having imposed onerous conditions upon other firms in respect of the limitation of output in regard to licences granted under the patent rights of the associated firms, and stipulations that the validity of their patents should not be disputed. The Association point out that their business is mainly founded upon their patent rights. They have a legal monopoly, and are not bound to grant licences. There is, therefore, it is submitted, nothing unreasonable in the owners of patents imposing upon those to whom a licence is granted conditions as to the amount of their production, and as to the admission of the validity of the patent rights. The firms constituting the Association had at command, at the time the Association came into existence, sufficient resources to build factories big enough to meet the demands of the country; and their patents had stood the test of litigation through the House of Lords. They did not take steps to make their own output equal to the demand. On the contrary, licences were offered to all the existing manufacturers. This policy, it is contended, proves that the founders of the Association had no desire to cripple, but rather wished to strengthen, the lamp industry of the country.

The Dutch Bargain. One of the cardinal charges in the report of the Sub-Committee was that the Association had bought 1¼ million half-watt lamps from Holland at 3s., and retailed them in this country at 12s. 6d. This was a point dealt with in the "Memoranda" last week, when it was shown that the larger part of the lamps were sold to the Government and some important establishments where arc lamps had to be replaced owing to the scarcity of carbons and labour. Some 97 to 98 p.ct. of the lamps went to large consumers at a price of about 8s. 3d., which is approximately the Sub-Committee's idea of what the price should have been. Thus the £280,000 profit alleged to have been taken in excess from the public by the importers and distributors is the outcome of the imagination of some calculator who was not aware of the actual facts. Moreover, it now appears that the importation of these lamps was the result of a bargain to obtain the assistance of a Dutch competing firm in building an argon plant in this country during the war—argon being the rare gas used in the half-watt type of lamps.

General Considerations. Later in their comment upon the report, the associated firms point to the large expenditure upon plant, and its reorganization as new developments were made. There are, of course, many and heavy risks connected with the starting of a new industry based on patents. Experiment, research, purchase of patents, training, return of goods that were faulty at the beginning through lack of skill and experience, costs of experts and patent litigation, and other expense have all had to be borne by the three patent-owning firms. It is learned that in this country the total lamp turnover of the associated firms to-day is only £3,000,000 per annum, or, after allowing the charges of the distribution trade, an average of 1s. 9d. per head of population. What the firms have spent in research alone during the last eleven years is shown by the following extract from a letter which the Association addressed to the Sub-Committee: "The total sum expended only on lamp research amounts approximately to £364,000, with a present annual approximate expenditure of £50,000." The Sub-Committee, it is stated, specifically omit these figures, and allege that they have no means of knowing how much of the research expenditure has been devoted to lamps.

Harmful Methods. In concluding the comments, the associated firms deal with a matter which is described as being of "national importance." We will let the remarks in this connection stand as presented: "The Committee, who seem to have been deliberately chosen for their lack of knowledge of the electrical industry (presumably in order to secure impartial judgment) held only nine sittings. In this short time, they attempted to take, to consider, and to report upon evidence in minute detail upon a large and complicated subject. It can hardly be wondered that in such haste they have ignored the economic position of the industry in the national life and the necessity of safeguarding a vital 'key' industry to the nation. It is suggested that this larger question should have been at least more fully recognized in making a report which will be considered by all competing lamp manufacturers in foreign markets, as well as by the home consumer. Ill-considered judgments of this kind when issued under the authority and direction of a Government department cannot fail to have the most mischievous results." This shows that the associated firms do not agree with the statement of the "Electrical Review" that "although the members of the Sub-Committee which carried out the inquiry are practically unknown in electrical circles, they appear to have acquired a thorough grasp of the subject; and, while the report is not free from mistakes, it is on the whole a very able, impartial, and judicial pronouncement."

German Association of Gas and Water Engineers.—A preliminary announcement states that the sixty-first annual general meeting of the Association will be held on Thursday and Friday, June 17 and 18, at Harzburg, under the presidency of Herr E. Körting, of Berlin. The list of papers to be presented will be issued later. It is intended to have, in connection with the meeting, an exhibition of novelties in gas manufacture, works control, distribution, and the use of gas. The arrangements for this exhibition are in the hands of Herr Lepsien of the Constructional Staff of the Corporation of Brunswick.

New England Association of Gas Engineers.—The reports of proceedings at the 1917, 1918, and 1919 meetings of the Association have been bound up in one volume, a copy of which is just to hand. The matter and illustrations occupy 450 pages; and the volume altogether is proof of the activity of Gas Association work in the United States. Some twenty papers and discussions are recorded, besides the reports of various Committees. There are portraits of the Presidents for the three years, who were respectively, for the forty-seventh, forty-eighth, and forty-ninth meetings, Mr. H. C. Crafts, Dr. J. F. Wing, and Mr. J. Arnold Norcross.

THE BUILDING TRADES EXHIBITION.

There have been building exhibitions extending over the past twenty-five years; but the series had, of course, to be suspended during the war. Now, for the first-time since 1913, Olympia is again given over to a display of materials and goods of all kinds appertaining to the building trades; and the whole of the lettable space in the great building has been allotted. The exhibition generally is quite a good one; and gas—as it should be on such an occasion—is fairly represented. There is also a good show of road-making substances and spraying machines, reinforced concrete systems, and some air-gas systems. Several of the stands are necessarily very similar in character to those of the same firms at the recent Ideal Home Exhibition*; and to that extent, of course, it is unnecessary to notice them again in detail on this occasion.

Gas Fires, Cookers, and Water Heaters.

In a commanding position near the entrance is a big stand in square formation, divided into four sections, which are devoted respectively to the goods of Messrs. Arden Hill & Co., the Davis Gas-Stove Company, Ltd., the Richmond Gas-Stove and Meter Company, Ltd., and Messrs. John Wright & Co., Ltd. In all cases the exhibits have been well selected, special attention being drawn to apparatus suitable for use in connection with the projected housing schemes.

Arden Hill & Co.

Glancing first at Messrs. Arden Hill & Co.'s display, there is the "Acmefont" builder's set, a combined gas-heated hot-water circulator and storage tank, with which the gas consumption is automatically controlled and economized. When full-on the consumption is 40 c.ft. per hour maximum; but when the water reaches the temperature to which the thermostat is set, this is reduced to 5 c.ft. per hour. The "Economy" valve, with the two return connections at the cylinder, is a source of marked economy, and is, of course, a great convenience, by giving the storage tank two capacities to meet the two widely different domestic requirements—bath water and other purposes. The dual return connection, with the "Economy" valve open, allows of 20 gallons being heated for baths; but at other times, with the valve closed, 6 gallons only are in circulation. Starting all cold, a hot bath is obtainable in from 40 to 50 minutes, and a second bath in less time. Dish-washing water (with the "Economy" valve closed) is heated at the rate of 18 c.ft. of gas for 6 gallons.

Among cookers, there are the "Super-Acme" and "Brownie;" the latter being specially suitable for use where space is limited, or where the requirements of the family are small. The new "All Cast" wash-house boiler, which is perfectly rustless, is being supplied in large quantities. The outer case is of cast iron, and the pan is of the same material. It has a wooden lid, which can be removed to give complete access to the boiler all round. There are various patterns of fires, with patent injector-ventilating action, and silent burners, including the "Gnome," "Olak," and "Urban," suitable for housing schemes. The effect of this ventilating action is to change the atmosphere of the room completely a number of times per hour—in some cases as often as six times. The "Frame" gas-fire, with the latest improvements, is for use in situations where the comfort of a gas-fire is desired, without interfering with an existing design of coal grate. In the way of gas-steam radiators, there is the "Mars," a self-contained and economical apparatus.

The Davis Gas-Stove Company.

Specially designed, for use in national housing schemes, there is the Davis "N.H." interior (an inexpensive gas-fire with high-grade features), a sample of which is included in the exhibit of approved national housing appliances by the Building Material Supplies Department of the Ministry. With fittings of the best, this fire has been specially priced to compete successfully with the cheap conventional mantle-register coal-grate. The initial adoption of this interior, of course, enables coal-fire flues and chimney breasts to be done away with, and the "Nautilus" gas-fire flue to be substituted, with substantial resultant economy in building costs. The front casting of the "N.H." interior has been made readily removable by screw fixing, to permit of brick repairs or replacements without any interference with the setting of the fire. Other gas-fires, with very handsome surrounds, are the "Standen" and "Jacobean." The "Gascol" is a convertible gas and coal range; and there are also "New Davis" and other gas-cookers. A selection is on view of gas-heated steamless radiators.

A feature is made of a working display of geysers and hot-water apparatus, rendered possible by the fact that gas and water are laid on. By the way, the excellent plumbing work to be seen here has been much remarked upon by visitors. The Davis "Auto-Economic" gas-heated circulator, with thermostat, has for its principal function to furnish, through a storage system, a ready and adequate supply of hot water for domestic purposes at any time during the day or night, when the kitchen range is not in use. It also operates effectively and economically in conjunction with the kitchen range boiler—supplementing the latter's water-heating capacity to the required extent when the hot-water supply would not otherwise be sufficient. It can be used in connection with its own independent storage tank, or it may be connected to an existing system, in which case the same storage tank serves both for the boiler heated by the coal-range and for the gas-heated circulator. This form of construction results in great efficiency; and the internal parts are readily accessible. There are various geysers—including the "Perfecta" sealed type, which is very suitable for use with hard water, because it can be easily taken to pieces for the removal of deposits. The "Midget" lavatory geyser is also of the sealed type, and particularly attractive appearance. The outer casing and cover are of aluminium, polished and lacquered; the body being mounted upon a white porcelain enamelled base-plate and bracket.

* See "Journal" for Feb. 10 last, p. 298.

Richmond Gas-Stove and Meter Company.

"Bungalow" cookers have been specially designed to meet present-day requirements, and are now made in five sizes. The "Bungalow" is placed on a stand with a white enamelled top, which presents a hygienic appearance, secures a suitable working height, prevents floor draught interfering with the burners in the oven, and materially assists in increasing the heat. The hot-plate (where the greatest percentage of work is concentrated) has been carefully planned; the burners being so placed as to prevent the utensils overlapping. Hence the utmost efficiency is obtained without waste of gas. In addition, there is a patent grill —*i.e.*, by raising or lowering, it can be used for grilling or boiling as desired. The taps are placed in front, which offers facilities when operating, and enables the cookers to be placed in a narrower space.

The "Economic" and "Blackpool" wash-boilers can be provided with a connection for the supply to a bath, where this is on the same level. They are fitted with galvanized sheet-metal outer casing and rustless cast-iron or copper pan. Special attention may be directed to the "Lyn" boiler, which is simple in design, while at the same time efficient. The gas consumption to maintain the full capacity of boiling water is infinitesimal, as the boiler is fitted with an automatic thermostat valve which effectively controls the gas supply. The "Lyn" (which is for fitting over the scullery sink or lavatory basin) is intended to supply hot water during the summer months, when coal-ranges are not in action; and it is always full of water, so that it cannot be damaged by carelessness. It is constructed of copper, with tinned interior to prevent rust; and the exterior is art bronze finished.

The "Ironclad" circulator is to supply hot water to any part of the house, and can be connected to existing flow-and-return pipes from coal-ranges. The chief feature is accessibility to the interior, which can quite easily be thoroughly cleaned out, thus always keeping the heater up to maximum efficiency. The firm are also showing an alternative circulator known as the "Equator," which is designed for the same purpose as the "Ironclad;" but in this case the cylinder and heater are combined so that the apparatus is suitable for houses where it is not convenient to fix a hot-water cylinder. Here, again, the subject of cleaning the interior has been provided for by removing the lid on the top of the heater or the manhole at the side. There is a series of geysers, both open and closed types. The efficiency of these geysers is very high, and the cost of maintenance low, as accessibility has been carefully considered. They are particularly useful in localities where water contains a high percentage of lime and other scale-forming properties. By simply lifting three lids, the water-ways and gas-heating ways are exposed for thorough cleaning. The patent telescopic flue calls for special mention, inasmuch as, in the event of any cleaning of the interior of geysers becoming necessary, this flue obviates any possibility of damage to bath-room decorations. It is made of three parts, and enables incrustation to be easily removed.

There is the latest "R.H.D." fire, which has an extended circular front; the object being to diffuse the heat from the sides of the fire as well as from the front. The demand has proved that this design is appreciated. Examples of the "Period" series of fires are also shown. For heating entrance-halls, there are gas-steam radiators, and hygienic condensing stoves.

John Wright & Co.

One of the main features of the exhibit is the new "Eagle" gas-range. This has been designed (with various points of departure from previous custom) so as to ensure that every possible heat unit from the flame is allowed to concentrate on the vessel above. The burners are specially constructed to give a maximum range of duty and to secure all possible economy in gas consumption. Some of the burners are on the duplex principle; and an extension piece can be attached to either or both sides of the hot-plate. There are points about the oven also which make for efficiency and economy, and various other characteristics attaching to the cooker making for higher efficiencies, which have already been emphasized in the columns of the "Journal."

The "B.Th.U." circulator and storage-tank set, with gas consumption controlled and economized by a patent automatic positive-acting thermostat and an "economy" valve, possesses advantages of compactness, convenience, &c., which render it particularly suitable for workmen's dwellings and business places, where space is limited and labour must be minimized. Easy access to remove deposits is provided for; and the tank is supplied in four sizes. When required for hard-water districts, the internal metal parts are treated with "Antiscale" protection. This enables lime deposit to be removed without detriment to the apparatus. For soft water areas "Bower-Barffing" prevents corrosion of the internal metal parts. The storage tank may also be made of copper. With

the special valve and connection arrangements, only on the few occasions when baths are required is the full capacity of the apparatus put into circulation. The "Novo" wash-house boiler, with cast-iron outer case and pan, is more durable than galvanized iron; and the pan is "Bower-Barffed" as a protection against rust. A surrounding ridge keeps water from running over on to the floor. There are no corners or ledges for dust to settle on, and no sharp edges to injure the hands or clothes.

Fires are represented by the handsome "Kenilworth" pattern, and by the "Swastika" series of injector-ventilating fires. The St. Andrew gas-heated steam radiator is also included.

South Metropolitan Gas Company.

In these servantless days, the overworked housewife who visits the Exhibition will be interested in the display in the gallery of the South Metropolitan Gas Company, which is designed to show the labour-saving capabilities of gas in a small home. The great thing is, of course, the avoidance of the work of handling, burning, and cleaning-up the inevitable ash and dirt of solid fuel; but beyond this there are conveniences.

There are four rooms tastefully furnished, and lighted throughout by "Metro" burners on very chaste fittings. In the kitchen-scullery, there is an ordinary gas-cooker connected with a gas-circulator, which is supplying a bath, lavatory basin, and sink. Gas-irons and a plentiful supply of suitable literature complete the equipment here. The living-room is provided with a "Metro" fire, with a pilot lighter at the side. The gas-lights are controlled by pneumatic switches. The "Metro" lighting is arranged to demonstrate the suitability of gas for rooms with low ceilings, and the ventilating arrangements are worth notice. Another "Metro" gas-fire, but this time with a boiling-burner at the side, is in the bed-room. Then there is a bathroom, with a small geyser, and the hot-water laid on from the circulator in the kitchen.

In the Official Guide to the Exhibition, the South Metropolitan Gas Company are able to make the highly significant announcement that of the 1296 houses built by H.M. Office of Works in Well Hall, London, S.E., 1286 use gas only, 9 gas and electricity, and 1 electricity only.

"Novoid" and Other Specialities.

Those concerned with building construction of any kind will find much to interest them in the display made by the Torbay and Dart Paint Company, Ltd., of No. 26, Billiter Street, E.C., of waterproofing, weather-proofing, and other materials. There is a small motor-car house built of solid clinker concrete blocks, faced upon both the inside and outside faces with their "Novoided" cement rendering in a buff tint, which was applied while forming the blocks in a block machine, thus making the blocks perfectly weatherproof when built into the walls. All the timber in the roofs, door, &c., has been treated with their flame-proof stain "Quelle," and the inside walls with "Rencrete," which the firm make in suitable tints, more especially for use as a weatherproofing upon outside walls. They have also various building materials such as fibre boards, composition boards, and fly boards, plaster slabs, and concrete slabs, coated with "Quelle," "Rencrete," and "Everok"—the last named being a colourless solution for weatherproofing exterior walls where "Rencrete" would not be suitable. They show many shades of "Aurora" distemper, which is really washable within one week of being applied. Among recent work upon which these products have been used is a basement, wholly below the ground level, that was always flooded and unusable in the winter, at the Hampstead Brewery. The walls were treated with "Everok" and "Rencrete," and the floor rendered with portland cement and sand, with 14 p.ct. of "Novoid" added to the cement. This was successful in keeping the cellar dry. An incident in this work proved the effect of "Novoid." It became necessary to cut through the floor to an old sump below for pumping purposes. When the workmen cut out the "Novoided" concrete, water spurted through the vent to a height of about 3 ft., thus showing the water pressure the floor was resisting.

No doubt, the feature of the exhibit which will make most particular appeal to gas engineers is a series of clinker concrete tanks, rendered inside with portland cement and sand, with a percentage of "Novoid" added—the "Novoid," it may be explained, which is the principal manufacture of the Company, being a powder which chemically acts upon portland cement, and renders concrete weather, water, and oil proof by filling the voids with insoluble silicates. "Novoid" can be used to make acid-resisting concrete; and the various tanks contain, among other liquids, tar and ammoniacal liquor from gas-works and sulphuric acid. There is a model of a sulphate of ammonia container in "Acid Novoid" concrete; and attention is drawn to the low cost of this, as compared with a lead lining. Exactly what is effected by mixing "Novoid" with concrete is shown by a series of photomicrographs of plain portland cement and a mixture of "Novoid" and portland cement. With the cement alone, the voids are clearly seen; and the filling of these is proved to have followed the introduction of 7 p.ct. of "Novoid"—the claim of this material to increase strength, in addition to its other qualities, being thus understood. Experiments have demonstrated an increase of 80 p.ct. in the compression value of concrete by adding "Novoid," as well as a higher tensile figure.

Potterton Gas-Boilers.

A selection of "Victor" gas-boilers, with other of their well-known water-heating apparatus, can be inspected at the stand of Mr. Thomas Potterton, of Ravenswood Road, Balham. There are also both water-controlled and air-controlled thermostats in operation.

A main feature of this exhibit is a small-capacity plant specially designed for use in connection with the London County Council housing scheme. What this apparatus will accomplish can be seen from the figures reproduced below, which refer to a test made under careful supervision. Working-out the cost at the prevailing slot-meter rate (which is, of course, more than would be the case with an ordinary meter—*i.e.*, 16⅔ c.ft. for a penny), this test shows that a good bath can be obtained at an outlay coming within 2d., under present high rates; and there is a small reserve left afterwards for other purposes. With the use of the patent cut-out valve 3 gallons are heated before the thermostat operates; this being intended to meet the demand for ordinary domestic use when baths are not required. It should be noted that the temperature of this small supply will be between 140° and 150° Fahr., according to the temperature of the cold water. A point made is that with this apparatus high-temperature water in small quantities is available immediately, without successive re-heating. The plant in question has been fitted to the order of the South Metropolitan Gas Company, as a sample installation for the small tenements housing schemes. This particular block, as already stated, is one of the London County Council dwellings; and it is hoped that the apparatus will be adopted for their new buildings.

Report of a Test made of No. 50 Potterton's "Victor" Gas-Heated Hot Water Apparatus at L.C.C. Buildings, Webber Row, Waterloo March 30, 1920.

Initial temperature of water	51° Fahr.
Gas lighted, 2.59 p.m., meter index	00181 c.ft.
Gas out, 3.44 p.m., " "	00213 "
Time, 45 min., consumption	32 "
Water drawn in bath	3.44 p.m.
Highest temperature	148°
4½ in. deep in bath	133°
5 " " "	130°
6 " " "	118°
7 " " "	110°

The cost of gas consumed would represent 2d. at slot-meter rate.

The water supplied covers the requirements of all household demands, whether for culinary requirements or bathing.

Ewart & Son.

A large show of geysers is made by Messrs. Ewart & Son, Ltd. of Euston Road; but the exhibit calling for special mention is the "Industria" water-heater, which has been designed specially to meet the demand for inexpensive water-heaters for new housing schemes requiring a hot-water supply to bath and sink, when both are on the same floor. It is a gravity heater, so arranged that, while the main part of the apparatus contains 15 gallons, and requires about 25 minutes to heat sufficient water for a bath, a small subsidiary boiler is fitted that will heat about 1 gallon to practically boiling-point in about 5 minutes. A point about the appliance is that it costs very little to instal. To save cleaning, the outside is enamelled.

Other Exhibits.

Messrs. M'Dowall, Steven, and Co., Ltd., exhibit (among other cooking and heating specialities) their "Combyn" coal and gas fire. The "Hurry" Water-Heater Company have their gas water-heating appliances of various patterns, as well as a gas-copper for boiling clothes and for delivering hot water to a bath fitted on the ground floor. At the stand of the Aerograph Company, Ltd., paint-spraying can be seen in operation. The Staines Kitchen Equipment Company include samples of "Ajax" geysers. There are ventilating fans by the Sturtevant Engineering Company, Ltd. The "Solignum" wood-preserving stain of Messrs. Major and Co., Ltd., can be examined amid appropriate surroundings. Many specialities are to be seen at the stand of the Leeds Fire-Clay Company, Ltd. Also at that of Holophane, Ltd., where there is a new design of reflector-refractor for interior lighting, employing a combination of reflective and refracting properties. The street-lighting refractors consist of a special two-piece enclosing bowl designed to give extreme lateral light distribution. There is a smooth surface both inside and outside, so as to facilitate cleaning.

The Carron Company show a few gas-fires. Messrs. Jenkins and Co., Ltd., draw attention to a smokeless boiler stove and gas or electric cooker combined. The waste heat from the boiler fire travels round the cooker, in order to reduce the quantity of gas or electricity needed for maintaining a cooking heat. General Trading and Manufacturers, Ltd., exhibit the "Ventiheater," on behalf of which various claims are advanced, including a very small gas consumption, an effective ventilating effect without any draught, and absence of intricate working parts. Gas appliances are also to be found on one or two other stands.

Encouragement of Industrial Research.—The Secretary of the Department of Scientific and Industrial Research announces that a licence, under section 20 of the Companies' (Consolidation) Act, 1908, has been issued by the Board of Trade to the Scottish Shale Oil Scientific and Industrial Research Association, which has been approved by the Department as complying with the conditions laid down in the Government scheme for the encouragement of industrial research. The Association may be approached through Mr. W. Fraser, C.B.E., Scottish Oils, Ltd., No. 135, Buchanan Street, Glasgow.

NEW "UKAY" INVERTED LAMP.

There are many uses for such a lamp as the new "Ukay," which is a development of the original lamp of the same name introduced some ten years ago by Messrs. Falk, Stadelmann, & Co., of Farringdon Road, E.C., to meet outdoor lighting requirements.

Perhaps the first point to strike one is the durable character of the lamp; the burner parts and the whole of the interior metal fitments, together with the hinge and bolt, being substantially made from brass castings or brass roddings. The casing, in enamelled steel or copper, is wind and rain proof; and the maintenance standpoint has been appropriately considered in the extremely simple construction throughout.

The lamp has been designed to secure the highest possible flame temperature at ordinary pressures. The bunsen tube is of the straight-down type, centrally through the lamp; and it is connected to a heavy cast brass superheater, to which the mantle nozzles [for various sizes of mantles, as desired] are attached, so that the mixture reaches the point of combustion in a highly preheated condition. All the burners are simultaneously adjusted by one gas-and-air regulator, operated from the outside of the lamp by a loose key, which can be removed to prevent subsequent interference. A feature of the lamp is the gas-adjuster, which is quite distinctive; the gas-passage being in the form of a slot, opened or closed by rotating the regulating screw. There is no needle-valve or small hole to choke-up the free gas-way; any foreign substance carried forward by the gas being easily cleared by the pressure of the adjusting screw when turned tight. The white enamelled reflecting surfaces are of correctly designed contour to give the most effective distribution of light.

There are other points about the lamp; but sufficient has been said to justify its claim to consideration.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Annual General Meeting.

The Annual Meeting of the Association was held on Saturday at the Grosvenor Hotel, Manchester.

Annual Report and Accounts.

The Hon. Secretary (Mr. J. Alsop) presented the report, which showed that the membership had remained as last year. The work of the Education Sub-Committee was reported up to the date of the meeting. Their work, however, is not finished; and it is hoped that in the near future a definite scheme will be submitted. The prize offered by Mr. Fairhurst, of Altrincham, for the best paper read before the Association on a subject relating to the engineering side of the profession has been awarded to Mr. W. H. Postlethwaite, of Salford, for a paper on "Efficiency of Boilers and Power Distribution." Mr. T. Duxbury, of Oldham, was the Adjudicator on behalf of the Association.

The Hon. Treasurer then read the balance-sheet, which showed a balance in hand of £2 6s. 10d.

The members agreed that it was a very satisfactory report.

Mr. R. H. Garlick (Salford), a former Treasurer, offered to give a prize of from two to three guineas for the best paper during the coming session by a junior member. He hoped that this would stimulate the younger members to qualify for a higher position in future.

Election of Officers.

The following appintments were made:

Vice-President: Mr. J. B. Stewart.

Hon. Secretary: Mr. J. Alsop.

Hon. Treasurer: Mr. J. Robinson.

Auditors: Messrs. H. Goodier and F. A. Collier.

Members of Council: Messrs. W. L. Heald, J. H. Dawe, G. Dixon, C. E. Teasdale, and S. Carter.

The Council Thanked.

Mr. J. T. Haynes (Lancaster), in moving a vote of thanks to the Council for the work done during the session, suggested that visits to smaller works, where smaller items could be discussed and more time spent, would be a distinct advantage—the discussion to be of an informal character, like the Liverpool meeting which followed on after the ramble round the works. He was very much in sympathy with the education scheme; and to his mind it should be developed. The Council had spent both time and money; and the best thanks of the meeting should be given to them for helping others to better themselves.

Mr. J. H. Dawe seconded the resolution; and Mr. C. E. Teasdale replied to the vote on behalf of the Council.

The Prize Presented.

Mr. S. Tagg (Preston), at the call of the President, made the presentation to Mr. Postlethwaite of the prize for the best paper last session. Mr. Tagg said he noticed that only two contributions had been made on the engineering side; and he urged the advisability of more contributions. The members who gave them would find great benefit. The high order of the papers given in the Lancashire district was most marked; and he hoped that the prize offered that afternoon by Mr. Garlick would meet with a good response.

Mr. Postlethwaite acknowledged the presentation in suitable words, and emphasized the statement that those who gave papers obtained the most benefit.

Introduction of the New President.

Mr. W. Fletcher, the retiring President, in introducing his successor, Mr. J. Bridge, said he thought a wise choice had been made, when it was decided to elect Mr. Bridge to the office of President. They had not made quite the progress that he would have liked; but yet, when one came to look round, a decided movement had been made on one or two very important subjects, which would show later on. He thanked the Council for their help.

Mr. Bridge proposed a hearty vote of thanks to Mr. Fletcher for the excellent manner in which he had presided over the affairs of the Association during the past year. They had all felt that Mr. Fletcher would fill the position of President with credit to himself and the Association; and these expectations had been fully realized. The office had been no sinecure. Many times Mr. Fletcher had been called to attend meetings in London, &c., at considerable inconvenience and expense to himself; but nevertheless he had always responded, and given the Association of his best.

At this point a notice of motion was read relative to a proposed alteration to Rule 9.

Inaugural Address.

Mr. Bridge then delivered his Presidential Address, which will be found on pp. 82-84.

Mr. A. L. Holton (Manchester) thanked the President for his address. He had thought Mr. Bridge would have some difficulty in choosing a subject; but he had selected a very suitable one. They could easily see that the author was interested in every item.

Mr. J. M'Lusky (President of the Yorkshire Junior Gas Association) seconded the vote.

Mr. W. J. Smith, B.Sc. (Bolton), remarked how pleased he was to see his Assistant occupying the Presidential Chair. He thought the Association had made a very wise choice, as Mr. Bridge was worthy of the position. He understood that Mr. Bridge had been a member of the Association for a considerable number of years; and his position that day was no doubt due to the hard work he had put in on behalf of the Association. Mr. Bridge had chosen an excellent subject, and one which they would find very useful in the future.

The vote was carried by acclamation.

Mr. Bridge suitably replied.

High tea was then served and a social evening followed, at which the usual toasts were honoured.

Rating of Machinery.—Acting under the advice of its technical consultants, the Machinery Users' Association has redrafted its Bill for the Rating of Machinery. The essential clauses now read as follows: (1) In the construction of any enactment relating to the gross estimated rental, gross value, annual value, net annual value, rateable value, or assessable value of any hereditament for the purpose of any local rate, or of the basis or standard thereof, or of any valuation list, or of any water rate, or water rent, the word "hereditament" shall be deemed to include such machinery only as is fixed or attached to the hereditament. (2) In the case of any hereditament occupied for any trade, business, or manufacture, the expression "fixed or attached" in the preceding section shall be construed as applying to all machinery, machines, or plant in or on the hereditament for producing or transmitting first motive power or for heating or lighting such hereditament; but save as herein provided shall not apply to machines, tools, or appliances which are only so fixed that they can be removed from their place without necessitating the removal of any part of the hereditament. (3) This Act shall extend only to England and Wales, and may be cited as the Rating of Machinery Act, 1920.

Coke-Oven Accidents in America.—Statistics have been compiled for the year 1918 by Mr. Albert H. Fay, on behalf of the United States Bureau of Mines, with regard to accidents occurring in the working of 59 661 beehive coke-ovens and 8137 bye-product ovens. Reducing all the data to 300-day workers, the average fatality rate for the five-year period 1913-1917 was 1·72 per 1000; whereas for 1918 it was 2·06 per 1000. In the latter year, the fatality rate for the beehive ovens was 1·16, and for the bye-product ovens 2·84 per 1000. The non-fatal injury rates were 131·11 for the beehive ovens, and 296·06 for the bye-product ovens, per 1000 300-day workers. It appears from the tables that the number of men actually employed at coke-ovens in 1918 was 32,389—many of them, of course, for substantially more than 300 days. Reduced to this basis, the number employed figures at 35,476. Of the actual number of men employed, 16,442 were engaged on beehive ovens, and 15,947 on bye-product ovens. In the year 1917, the coal used for coking in the United States was 83,752,371 tons; there having been produced 55,606,828 tons of coke, of a value at the ovens of $298,243,017, or $5·36 per ton. The percentage yield of coal in coke was 66·4. In 1917, 1,409,320 short tons of coke were exported; and in 1918, 1,687,824 tons.

SCOTTISH GAS MANAGERS.

Annual Informal Meeting in Glasgow.

The Thirty-Seventh Annual Meeting of Scottish Gas Managers was held on Wednesday last, in the Hall of the Royal Philosophical Society of Glasgow—Mr. John M. Smith (Stirling), the President, in the chair. The attendance was remarkably good; the gathering numbering fully 100, and representative of all parts of Scotland. The meeting, as in former years, was convened by Mr. J. W. Napier, of Alloa.

The Convener, having formally intimated a few apologies for absence, briefly introduced Mr. Smith, who at once delivered the following

PRESIDENTIAL ADDRESS.

Gentlemen,—Through having last year to leave the meeting early, I had not the opportunity of expressing my thanks to you for the great honour you conferred on me by electing me your President—an honour which I highly esteem.

On going over the list of Past-Presidents, names appear of many distinguished men who have made their mark in the industry; and it is with a feeling of misgiving that I follow their footsteps to-day. I trust, however, that you will forgive my shortcomings, and that some points may be brought out in my address and in the discussion that will be profitable to members.

We all thought that with the coming of peace, troubles and difficulties that had beset the gas engineer during the war would soon right themselves; and, although not hoping for a return to pre-war conditions, I must say I am disappointed that to-day an industry which has proved itself such a great national asset is still labouring under restrictions and regulations that were deemed necessary under the conditions of war.

The old conditions are not likely to return. Money is dear, and naturally everything that money will buy; but the brains that are in the industry to-day will, I feel sure, develop ways and means of allowing the gas engineer to put his product on the market in such a form as will defy competition. The position is, however, in great uncertainty; and until the powers that be formulate some fixed policy, and remove war restrictions, the industry is likely to continue in a position of doubt and difficulty.

COAL.

The position of coal is worse to-day than it has been for some years. Not only are supplies difficult to obtain, but the quality in some cases is entirely unsuited for the manufacture of gas, or for the methods of handling in force at the various gas-works.

Most of you have had coal troubles; but I think the gas engineers situated in the North-Eastern area of Scotland have had a most unenviable experience. Strangely enough the town of Stirling was informed that all coal brought into the town by rail had to be obtained from the North-Eastern area, notwithstanding that the coals mined in Stirlingshire are eminently suited for both domestic and industrial purposes, and one would think that the natural outlet for Stirlingshire coal was in the town of Stirling—the pits being only from one to five miles distant. The authors of the Coal Transport Order, however, think differently; and we are to-day bringing unsuitable gas-making coal from Fife, a distance of over thirty miles. Our coal-handling is all done mechanically; and the plant was naturally designed to work the local coals to the best advantage. So great was the difficulty in working the inferior coals that 50 p.ct. of our requirements were allowed under licence from the local pits, in order that a workable mixture of coals might be obtained.

The following tests show the mechanical difficulties imposed by having to use unsuitable coals in our plant.

No. 1 Splint.—Coal very dirty; 20 p.ct. of foreign material. 20 H.P. maximum required to break and elevate the coal; 17 H.P. average; 11 H.P. required to start pushing the charge, and 6 H.P. required after the charge is on the move. Residue after distillation 10 cwt. per ton, 60 p.ct. of which passed through a 1 in. screen. No coking qualities.

No. 2 Hartley.—Hardness of coal, medium. 18 p.ct. of foreign material. 18 H.P. maximum and 16·5 H.P. average required to break and elevate the coal. 9·5 H.P. required to start pushing the charge, and 5 H.P. when charge is on the move. Residue 10 cwt. per ton, 40 p.ct. of which passed through a 1 in. screen. Fair coking qualities.

No. 3 Hartley.—Hardness of coal, medium; 25 p.ct. foreign material. 18 H.P. maximum, and 16·5 H.P. average required to break and elevate the coal. 10 H.P. required to start pushing the charge, and 5 H.P. required when the charge is on the move. Residue 10 cwt. per ton, 50 p.ct. of which passed through a 1-in. screen. Poor coking qualities.

No. 4 Hartley.—Coal very hard. Large seam of foreign material running through the coal. 21 H.P. maximum, and 17·5 H.P. average required to break and elevate the coal. 11 H.P. required to start pushing the charge, and 6 H.P. required when the charge is on the move. Residue 10 cwt. per ton, 55 p.ct. of which passed through a 1-in. screen. Poor coking qualities.

No. 5 Hartley.—Hardness of coal, medium; 18 p.ct. of foreign material. 18 H.P. maximum, and 16·5 H.P. average required to break and elevate the coal. 9·5 H.P. required to start pushing the charge, and 5 H.P. required when the charge is on the move. Residue 10 cwt. per ton, 35 p.ct. of which passed through a 1-in. screen.

No. 6 Gas Coal.—Coal very hard and dirty; 27 p.ct. of foreign material. 19 H.P. maximum, and 17 H.P. average required to break and elevate the coal. 10 H.P. required to start pushing the charge, and 5·5 H.P. required when the charge is on the move. Residue 9 cwt. per ton, 65 p.ct. of which passed through a 1-in. screen.

Local Coal.—Coal soft and clean. 10 H.P. maximum, and 9 H.P. average required to break and elevate the coal. 6·5 H.P. required to start pushing the charge, and 3·5 H.P. required when the charge is on the move. Coke 14 cwt. per ton, 7 p.ct. of which passed through a 1 in. screen.

As the maximum horse power required for the coal-breaker and elevator motor is 20 H.P. and the discharger motor 11 H.P., it will be seen that we are almost working up to the maximum power. Hence mechanical troubles have been very serious. Some gas engineers, however, have been able to bring pressure to bear on the Coal Department, and are now getting supplies of suitable coal for their requirements. But the whole trouble is that the supply is not meeting the demand. The miner is receiving high wages and working short hours, which I am afraid are not conducive to increased output. Taking the Scottish coal pits, the output in 1913 was 42,456,516 tons—compared with 31,890,218 tons in 1918. The 1919 output should be better than 1918; but I expect it will still fall short of the pre-war standard. The price is continually going up—the most recent advance being due to increased transport charges; and the miners not having met with the success they hoped for with their Nationalization Scheme, have now presented their threatened ultimatum—*i.e.*, a further increase in wages. If the demand is granted (and we have the past experience of all the previous demands to help us in forming an opinion), it means that the price of coal is again going up; and a corresponding increase in other materials will follow in its train. Large increases in the consumption of gas have also helped to accentuate the shortage of coal supplies.

The Gas Rationing Order has been withdrawn, which (with all its worries and drawbacks) did help to carry us through a very serious period of short supplies. But nowadays, with domestic coal so scarce, and no better suited for household consumption than our present coal supplies are for gas manufacture, the consumer finds it much more convenient to heat and cook by gas, supplies of which can be obtained by merely turning a tap. Therefore the trouble comes back to the gas engineer to find coal for this extra consumption. Transport facilities, however, should now improve; and I hope, before another winter, coal stocks will have been replenished with suitable gas-producing coals.

LABOUR AND WAGES.

Labour is now more plentiful, and most of the men who had joined the army have been demobilized, and have returned to their former positions. Though some isolated cases have occurred where former employees have not been re-instated, the industry has as a whole acted nobly to the returned heroes. High wages continue to rule; and although we all thought the high-water mark had been reached some time ago, I doubt if we have even yet seen the end of the rise. But I think we can safely allow the Federation of Gas Employers to look after our interests. An interesting decision was given in the last award—*i.e.*, the grading of the award according to the size of the undertaking. This I think is a point gained, though I doubt if it will suit the Unions. But surely it is right that local conditions should be taken into consideration. The forming of the Employers' Federation has done much to obviate local troubles; and I find that much more harmonious working as between employer and employee has been the result. A Board (what might be called a Conciliation Board) has also been set up, consisting of gas employers and trade unionists, under the chairmanship of Mr. Legat, of Coatbridge. This Board has had some preliminary meetings, and it is now in proper shape. It is also proposed to set up local committees to discuss the position in the respective districts, so that local conditions may be thoroughly gone into.

SECONDARY PRODUCTS.

The question of secondary products generally is an absorbing subject, and much could be said about it. Dr. Davidson gave a very interesting account at the last meeting of the Institution of Gas Engineers regarding the wonderful progress that has been made in the dye industry, and how British Dyes, Ltd., is now taking-up the reins, which may in the near future place this country in the position which she held in the early days of the gas and dye industries.

The position of tar prices during the past few years was far from satisfactory to the producer—so far so that a Committee was appointed to consider the matter. After a careful marshalling of the facts, the Committee has reached a final settlement with the tar distillers, whereby the seller and buyer were placed on an equitable basis. You are all no doubt familiar with the

scheme that was drawn up; and it says much for the Committee's ability and foresight that we are to-day reaping such benefits from their labours.

Most of us in 1913-14 were receiving (under contract) 16s. to 17s. per 100 gallons for our crude tar, which price gradually fell in the succeeding years, until in 1918 only from 12s. to 13s. per 100 gallons was being obtained. Since the new scheme came into force the Arbiter's award has shown a steady increase in price; the February, 1920, award being 34s. 4d. per 100 gallons. Unfortunately, before the final adjustment of the scheme with the distillers was arrived at, tar contracts were in some cases entered into; but I expect that on the expiry of these contracts more undertakings will associate themselves with the scheme, which I consider is fair to both producer and purchaser.

The demand for tar for road-making is still increasing; and high values are likely to be obtained for this class of tar for some considerable time. Extensive renewals of tar-macadamizing are necessary; and with the great increase in road-borne traffic, the demand for a lasting and dustless road is likely to be permanent. After tests with various materials, the "Road Board No. 2 Tar" is still the cheapest and, I think, the most satisfactory on the market. But with the present price of about 1s. per gallon for No. 2 tar, it is just possible that competition may shortly be felt with Mexican bitumen mixtures. Bitumen is at present about £12 5s. per ton; but as transport facilities improve, and ships are able to discharge their cargoes without delay, this price is likely to come down.

The conditions of the sulphate of ammonia market have been somewhat similar to those obtaining last year, although it is now practically certain that the Sulphate of Ammonia Association will be merged into the newer body, the British Sulphate of Ammonia Federation, Ltd. The present price on a 24½ p.ct. ammonia basis is £22, with a higher price for increased ammonia content, and a further allowance for a reduction in free acid, is a considerable increase on last year's price. With export facilities being increased, the Association's equalization scheme has continued to act in a manner satisfactory to all producers. The advantages of sulphate of ammonia are, I think, now fully appreciated by the farmer; and although I have always sold my output direct to the local farmers, I find this year the demand very much increased. It is said that sulphate of ammonia is not suitable for the British farmer; but my experience is the direct opposite. I consider that the Stirlingshire farmers are as progressive and level-headed as their neighbours; and I have seen stretches of crops sown with nitrate of soda and other mixtures which could not compare with the crops grown with sulphate of ammonia. Farmers in Stirlingshire and Perthshire have, to my knowledge, entirely discontinued the use of nitrate of soda, and have used sulphate of ammonia for the past twelve years. Their experience is that sulphate of ammonia is superior to nitrate of soda for hay growing. The quantity used is usually 3 cwt. per acre, and the average yield about 4½ tons of hay per acre—about 1½ tons of hay per acre representing the increased yield due to using sulphate of ammonia. This reckoned in value to-day means that for every 66s. worth of sulphate of ammonia put on the land, a crop valued at £24 is reaped. I have repeatedly seen Timothy hay and oats growing 3 ft. high in Stirling Carse.

COKE.

The demand for coke (or smithy char, as we call our product) continues, although, even with the release of the rationing, I do not find a demand for this article for household purposes. There is no doubt that, although coke is a smokeless fuel, it is not suitable for consuming in a domestic open grate. Prices remain good, especially for export. It makes us lament our geographical position when we hear of the prices some of our friends who are favourably situated for shipping are receiving. The present demand makes us wonder if the old conditions will ever again return, when almost every gas-works in the kingdom had large stocks of coke on hand, which they were glad to clear at almost any price. Under present conditions, the surplus stocks in the West are reckoned by only a few hundreds of tons.

With the shortage of coal, the question of gasification of coke is being pressed by the Coal Mines Department. Much of this is already being done by most of our friends who have vertical retort installations, and by a few who still have horizontal settings, by utilizing a portion of their coke for the manufacture of blue water gas, by steaming the charge. I worked on the steaming process of our horizontal retorts for a considerable time, with varying results; but I cannot say that I ever reached anything like the returns that could be obtained with vertical retorts. Latterly I decided to discontinue the process, owing to the decreased output per retort and the present high coke values.

I have now come to the conclusion that it is going to be much more economical to produce blue water gas in a plant designed for the purpose. I am at present erecting such a plant, from which I am expecting results that will be to the mutual benefit of the Company and the consumers. Much has been said during the past year by our friends across the border about the question of water gas; but I hope we shall hear in September what is being done by our own members. Results I know have been obtained in recently erected plants which show the possibilities of such a method of the gasification of coke. The all-gasification of coal is a process which may lead to great possibilities, whether it is arrived at by one or two operations; and the time has come when we must look for the best method of conserving our supplies of coal. Great strides have been made in our industry since the days of the flat-flame burner; and we are again at a period of our existence when circumstances may compel quite a revolution in our ideas and methods of production.

SALES.

Much has already been done to popularize the use of gas; and just as we are setting our house of manufacture in order, so must we set our distribution in order. Our product must be presented to the consumer in such a form that it can be used by him (or her) with efficiency and economy; and we must not relax our efforts in educating the consumer as to how this efficiency and economy can be obtained. The benefits of the practice of cooking and heating by gas are known to the majority of gas consumers; but these benefits can easily disappear by the use of badly installed apparatus.

Gas authorities must be prepared to keep a sufficient supply of expert fitters who are not only able to fit up gas appliances, but are sufficiently intelligent to impart to the consumers the knowledge required to keep their appliances in a state of efficiency. In old houses, where the gas-supply pipes and internal fittings are of inadequate size to meet any increased demand, the proposal to instal additional gas apparatus in these premises presents a difficulty. From our point of view, however, it must be faced; and I find now that so many houses are owned and occupied by the same person, that any reasonable offer in the way of a compromise is seldom refused. We should keep in close touch with architects; and wherever new buildings are being proposed, a few minutes' interview with the architect may mean all the difference between satisfaction and dissatisfaction to the occupier of the premises, so far as the lighting and heating are concerned. This is all the more necessary, in view of the large number of new housing schemes at present going on; and although the "B.C.G.A." have done much in this field, the gas engineer must keep in touch with the local element.

I have just completed arrangements with the local architect of the Stirling Burgh Housing Scheme, whereby forty gas-heated wash-boilers are taking the place of as many portable coal-fired boilers, which were included in the specifications; and on the completion of these houses, other eighty are to be started on the same footing.

With the question of lighting, if the consumer is to be retained, attention must be given to the efficiency of the burners with which he is supplied. A great number of so-called cheap but worthless burners have been put on the market; and although not sold by gas authorities they have found their way to the consumer through stores and ironmongers. When the burners begin to fail, the complaint is not made to the supplier but to the gas office about "bad gas." The supplier of the burners has little or no interest in the articles after they have been paid for and handed over the counter; but should he be questioned, as often as not his reply is also "bad gas."

Education of the consumer, which should be done with tact, is the only way to eliminate the evil. Our own distributing mains must be regularly attended to, and the arrears of work overtaken which accumulated during the past years, on account of the scarcity of labour and material. Twenty-four hour charts of pressure should be regularly taken over a wide range of the district. The engineer will then be thoroughly conversant with what is taking place. Defects will be discovered—such as high banking-up of pressure during the hours of minimum demand, with a corresponding drop during the hours of maximum demand—and the trouble may be traced to naphthalene obstruction, or the main may be too small. Naphthalene stoppages are always difficult to deal with in the mains; and every endeavour should be made to tackle this troublesome matter in the plant at the works where, with care, it can be reduced to such an extent as to give little or no trouble throughout the distribution system.

Some of us, who have recently experienced a large increase in consumption, view with concern the arrears of renewals of distributing mains. In Stirling I am faced with mining villages growing by leaps and bounds, and miles of larger mains being required in the very near future. Where is the money to come from? Revenue may meet a part of the cost; but most of the money must be borrowed at anything from 5½ to 6 p.ct. while present legislation allows us to pay only 3¾ p.ct. dividend.

While gradually getting clear of the filling-up of forms and supplying statistics to Government, an order relating to the reduction of all domestic coal by 10s. per ton has come along, and we are again being brought into contact with that complex and involved method of carrying out a scheme which appears to be the necessary qualification of many Government officials. While most of us consider a flat reduction in the price of coal would have met the case, still we are carrying out the letter of the order to the best of our ability, by handing-on to the domestic consumer the equivalent of the 10s. as a rebate in the price of gas, less 5 p.ct. for working expenses.

IMPROVED STATUS AND SALARY.

The status and salary question is as pressing to-day as when the subject was first mooted. Certainly some gas engineers have been well treated by their boards as regards salary, while again nothing short of compulsion will be required to make other boards realize their responsibilities to their engineers. The difficulties of the status question have been frequently discussed on other occasions; and we had hopes of something tangible being done in the near future when the "N.A.T.G.O." was formed. Some glaring

cases still appear of situations being offered and accepted at ridiculously low remuneration when the size of the undertaking and the responsibilities attaching thereto are considered. The evil is not confined to the smallest concerns, for even places producing over 100 millions are being offered at a salary having a pre-war value of about £150 per annum.

FINANCIAL HARDSHIPS.

The financial question has been a serious one to the industry during the last few years, especially to statutory companies working under the sliding-scale, and also where a maximum price is in force. The Financial Hardships Bill is much overdue, as the conditions have vastly altered since the date of the passing of the respective Acts. Relief was granted (at least it was called relief) which ensured to holders of gas stocks three-quarters of the standard dividend, or the pre-war dividend, whichever was the smaller. This pittance on invested capital cannot be expected to attract new capital to the industry; but, notwithstanding these financial conditions, we have been asked to proceed as extensively as possible with contemplated extensions and renewals, in order to reduce the numbers of unemployed. Capital and labour must in this case hang together, as very little additional labour can be employed with the present position of capital.

A Bill is at present before Parliament to provide for the variation of the provisions regulating the raising of capital by companies carrying on certain statutory undertakings. So far this is a step in the right direction; but to analyze the Bill thoroughly it would be well to know what is to be done with the old capital already invested.

The Government Bill (existing gas standards, maximum prices, and dividends) is, I understand, to be introduced soon after Easter. I had hoped the Bill would be introduced before the end of last year; and an interesting and profitable discussion could have taken place on it to-day. I trust, however, that the Committee of the National Gas Council who were appointed to look after this matter are not putting hopes before us that will not be realized, and further delay take place. With some of the contents of the Bill you are already familiar, regarding the new basis of calculating the selling price of the gas, the percentage of the inerts, and the raising of the minimum pressure supplied. What the other provisions are we do not know; but we will require to wait patiently until the Bill is brought forward, and surely now the Government in their Bill will give some relief to the unsatisfactory position of the industry, which they themselves have helped to bring about. Money at the present time cannot be said to be well invested that is only bringing-in something like 3 p.ct. After all that has been done by the National Gas Council in giving publicity to the adverse state of affairs, and since the local members of Parliament have been approached on the subject, there is an optimistic feeling about that the Bill will go far towards stabilizing the position of statutory gas companies. I know that this subject does not affect the majority of Scottish gas undertakings; but unfortunately the Stirling Gaslight Company is one of the minority.

CONCLUSION.

In conclusion, if by going over the general questions before the industry to-day fresh impetus has been given to your thoughts on different points, I shall feel amply repaid for my efforts, as it is only by deep thinking and much research that we shall be able to uphold our position. I have never forgotten the remarks made to me by the late Mr. George Malam, of Dumfries, when I took up the position there as his assistant: "Keep your eyes open, and concentrate your thoughts on what you want done. After your mind has been made up, put your ideas before your board, and see that you get your ideas carried out." This I consider was good advice; and it equally applies to-day. We cannot stand still. Standing still is equivalent to going backwards, and we must continue to go forward. It has always been characteristic of the Scotch people to "hasten slowly," which means that problems are well dissected before a decision is come to. Shakespeare (in Julius Cæsar) says: "We must take the current when it serves, or lose our ventures." We may aptly apply this to our industry to-day. Our industry has come through trying times of war; mistakes have been discovered; and wonderful fields for development lie before us. The tide is at the flood. Our talents must be developed now, for the good of our industry in particular, and for all mankind in general.

DISCUSSION.

The Convener said that Mr. Smith's address was now open for discussion. Perhaps it would be appropriate if he called upon Mr. Cowie (the President of the North British Association of Gas Managers) to open this part of the proceedings.

Mr. Robert W. Cowie (Port Glasgow) said he had not intended to speak at this early stage of the debate, although he did propose to say something at a later point on a subject not exactly bearing on the issues raised by the address. Mr. Smith had given them an interesting address, and one which certainly did not lack points for profitable discussion. Obviously, the President had been right up-against the the trouble they had all been experiencing lately in regard to the quality of coal that was being received in the gas-works of the country. Mr. Smith was in the fortunate position of being able to sell whatever gas he was able to make; but had he been in Port Glasgow, he would have found the hardships to be accentuated. In Stirling, it was evident that the chief difficulties of the President had been related to troubles with the machinery for dealing with the hard stone and dirty coal. He agreed with practically all that was said in the address on the question of labour and wages. He did not know when this tendency for wages to soar upwards was going to stop. The position was simply this, that in some of the works he knew of the gas would require to be advanced in price if increases in wages were to continue. Later on in his address, the President dealt with the improved status and salaries of gas managers. It was thought by many that, after the annual meeting of the North British Association in Edinburgh in September last, some headway would have been made by this time. Unfortunately, there had been little progress; and although the question could scarcely be said to have been shelved, it was as near to that as it possibly could be. They had heard little, if anything, of what was being done by the National Association of Technical Gas Officials. In September, at the annual meeting of the North British Association, they were advised to leave their own scheme alone, as those in England associated with the "N.A.T.G.O." would press the subject to a definite point. A little more was now being heard of the Association, and possibly something would emerge in the near future. Mr. Cowie thereafter touched shortly upon a minor point, not covered by the address, relative to the painting of the inside of gasholders in order to prevent corrosion.

The Convener interposed at this point to say, *apropos* of the remarks of Mr. Cowie, that recently he received a communication from the General Secretary of the National Association of Technical Gas Officers. That gentleman appeared to be anxious to extend the propaganda work of the Association; and he had expressed a desire to address a meeting of Scottish gas managers with a view to acquainting them with the intentions of the Association. Although he had duly notified the General Secretary of the date of the present meeting, he had not heard anything further from him. Doubtless the intention was to hold over the meeting between the General Secretary and the Scottish gas managers until a later date. It would be observed that two specimens of peculiar interest to the gas industry were on the table; and as these related in a way to certain research work which was being carried on in the Uddingston Gas-Works, he would call upon Mr. Laurence Hislop to explain what the specimens meant.

Mr. Laurence Hislop (Uddingston) said he was willing to do so if the reporters undertook not to record his observations. As the gentlemen present were well aware, certain research work was still being carried on at Uddingston, under the ægis of the Institution of Gas Engineers; and he did not consider he was at liberty to make public any of the results that had been obtained, either in one direction or another. It would be sufficient to explain that the research investigators had set out to reduce coal under an atmosphere of steam only, and the result, as disclosed by the specimens produced for the information of the meeting, showed that such a thing was quite possible.

[A series of questions bearing upon the result and the specimens exhibited was addressed to Mr. Hislop, who, in the course of a lucid reply, insisted that, as the meeting was an informal one, the representatives of the Press should meanwhile refrain from publishing the details. Every point, he felt certain, would be fully gone into officially at a later period. He indicated generally, however, that, as the outcome of the experiments, they had found the most economical gas to be 430 B.Th.U. The phrase "most economical" was arrived at after taking into account the value of residuals and other things. This conclusion was come to on the basis of day-to-day ordinary working, and without giving any scientific attention to the plant.]

The Convener said it would be interesting if Mr. Broadwood, of Coatbridge, would also give the results of his recent experiences in this connection.

Mr. Geo. Broadwood (Coatbridge) indicated that he had not come to the meeting prepared to enter into precise or lengthy details on the subject that had been raised. He was, however, disposed to say that Mr. Laurence Hislop was about right in his conclusion as to the most economical gas. There seemed to be no doubt that, for a make of 20,000 c.ft. per ton, something in the region of 400 B.Th.U. was the most economical gas. At Coatbridge, they had no verticals, and a third of their output was water gas. Their average ran to 17,000 c.ft. for 450 B.Th.U. As time went on, he felt quite confident they would increase the proportion of water gas in their make. In view of these circumstances, they would all be ready to concede that there was nothing impossible in what Mr. Hislop had been telling the meeting. At Coatbridge, they had under contemplation the erection of verticals; and once these were installed, he was hopeful that there would be even improved results as compared with those he had that day briefly touched upon.

Mr. Laurence Hislop said that a good many gas-works throughout the length and breadth of the country stood very much in need of new plant; but at the present ratio of costs, the introduction and installation of verticals became an absolutely ruinous proposition. If, then, they could be furnished with reliable data in regard to the manufacture of water gas in horizontals, many undertakings would be in a position to tide-over their difficulties until the cost of plant came down. He feared it would be ten years at least before it would be possible for a few undertakings to face the question of installing verticals. As he had indicated, the cost of such plant at the moment was positively ruinous.

The President said they were all "John Tamson's bairns" in this meeting, and he hoped there would be no hesitancy whatever in discussing new ideas and processes. Members of the industry who were engaged in new processes of any kind ought to step forward and give the meeting the benefit of any experience they might have had.

The Convener said it would be interesting if they could have from Mr. Braidwood figures as to the amount of water gas he obtained per ton of coke.

Mr. Braidwood said he could not tell specifically what coke they were using per 1000 c.ft. At the same time, however, he could speak as to the effect on the balance-sheet. Since putting up the water-gas plant they had increased the make at Coatbridge from 11,000 c.ft. to fully 17,000 c.ft.

Mr. John W. M'Lusky (Glasgow) said that there was a time when it was permissible to ask, "What about Glasgow?" But so far as the gas industry was concerned, the query had been revised to read, "What about Uddingston?" The real truth of the matter was that Glasgow people had come now to look upon Uddingston as a research station, and not so much as a gas-works. Touching upon the coal

supply and the coal control, he said he quite agreed with the remarks made by some of the preceding speakers. No doubt they of the gas industry were always very courteously received by Sir Adam Nimmo and others. Assurances were always forthcoming that the Government was grateful for all that had been done by the industry in the national interest; but despite all this, they did not seem to be able to get any better service. As a matter of fact, assurances and compliments of this kind did not seem capable of getting any more coal into gas-works. The plain truth was that they had well-nigh exhausted their vocabulary in their comments on the coal situation—indeed, to-day they would like to see coal even with stones in it. To be quite candid, they did not even get delivery of stones. When he informed the meeting that at the moment there was only one day's coal supply in the Dalmarnock Gas-Works, all those present would be prepared to agree with him that treatment of this kind was simply abominable. As an industry, they were not up-against anything in the way of personality. They were rather up-against a sort of Government system which did not appear capable of being altered by anybody. In Glasgow to-day they had about 35,000 tons of coal in stock as against 52,000 tons at the corresponding date last year. In the course of his Presidential Address, Mr. Smith had asked the question, Where was the money to come from? He felt he would rather ask, Where was the coal to come from? Money did not get more coal, and money did not make gas. He had been very much interested in the tar figures which the President had included in his address. These went to show that co-operation had proved very successful indeed. There was clear proof now of the things which they had talked about long ago. On the question of blue water gas, he might remark that during the war the amount of coke needed in Blackburn per 1000 c.ft. of gas rose from 35 lbs. to over 80 lbs. Furthermore, an engineer in England put up a nice new plant—he would not name the place or the plant—and right away used 80 lbs. He did not at all want to criticize blue water gas; but the blue water-gas plant depended on the quality of the coke. In Blackburn, though they tried all they knew, they were always up-against the bogey, naphthalene. In point of fact, it would go up and down like a barometer. Incidentally he might say he was interested in the brief details the President had furnished of the housing scheme in the burgh of Stirling. He wondered if the houses proposed were cottages or villas, and if each tenant was going to have his own washhouse or boiler. This was very much the English idea. On the general question of maintenance, he would like to say this, that if they intended to get satisfaction in the future there was one department which would require to be carefully and scrupulously supervised. Competent officials would need to be secured for superintendence over the burners and fittings. The fittings and burners must be well maintained, because these were the things that would involve a good deal of money. Of course, Messrs. Hislop and Braidwood, as advocates of the principle involving the reduction of calorific value, must be prepared for an increased expenditure of money in maintaining the service. Fittings would require to be thoroughly looked into if there was to be the lower calorific value. He liked the advice Mr. George Malam, of Dumfries, had given to their President—viz., "Keep your eyes open and concentrate your thoughts on what you want done. After your mind is made up, put your ideas before your board, and see that you yet your ideas carried out." Personally, he would urge the importance of the last point. It was all very well to have clear-cut ideas; but sometimes these did not evoke the sympathy of the board or the gas or lighting committee. At the same time, gas engineers ought to be possessed of the faculty of impressing not only members of a committee or a board and the consumers, but they ought to be able to influence all and sundry with the feeling that their desire was to give the best gas so far as market values would allow, and the cheapest possible.

Mr. Lawrence Hislop said that if Mr. M'Lusky cared to refer to the Investigation Committee's report published last year in the Technical Press, he would find that an inverted burner of the ordinary type gave the best results, or at all events it fell within the category of giving one of the best results. This burner had a 6·10ths pressure with gas of 400 B.Th.U. It was quite evident from the experience at Uddingston that not much in the way of additional pressure was required for the low-grade gas. It was all a question of adjustment and manipulation of the appliances.

Mr. David Vass (Perth) said Mr. Smith appeared to have been much in the same position as the rest of them regarding supplies of coal, though it would seem he was more fortunate than most of them in getting a little more of his own district coal. In Perth, they did make a struggle to retain the Lanarkshire coal; but it was hopeless. On this point, however, he had been rather surprised within the last year to hear that Lanarkshire was almost as badly off for coal as they themselves in Perth had been. He really hoped the time was not far distant when they might have in Perth, as well as the rest of the country, a free market for buying coal. Referring to the arrangement now in operation for regulating the prices of secondary products, he ventured to express the hope that gas-works were going to reap a fair return for residuals through the Board that was to deal with these matters in the future. Those who distilled their tar ought to make certain that they took the fullest advantage of the new scheme. So far as he had been able to see, practically all works were benefiting by the advance in the price of tar. Reference had been made in the course of the discussion to the size of pipes used in dwelling houses. On this point, he thought they should keep in mind that there was a recommendation by the North British Association some years ago which aimed at the standardization of pipes in dwelling houses. It was possible that the details of the scheme might now be a little out of date. If such was the case, then an effort ought to be made to bring the scheme within the scope of modern requirements. Just recently, during the progress of a coal strike in Fife, they had in Perth been up-against the trouble of getting supplies of coal that happened to be quite unsuitable for the gas-works. A great deal of the coal delivered to them was from a source that had not been in the habit of supplying the gas-works in Perth, and was altogether unsuitable. The meeting, therefore, would not be surprised to learn that within two days the holders were down to a very low point indeed. After 8 o'clock at night they found themselves in the position of being unable to give the highest pressure.

Mr. A. Kellock (Airdrie) said that in the course of the discussion the remark had been made that there were several undertakings that might be described as being "on the hang" in regard to the introduction of vertical retorts. Airdrie was one of the gas undertakings in this position. With the situation as it was at the moment, there might be a tendency on the part of many undertakings to hold back a little. At the same time, he had been very much struck with some of the points that had emerged in the discussion; and a favourable impression had been created in his mind relative to the gasification of coal as a result of a perusal of the "Transactions" of other Associations. His own idea was that the theories advanced respecting the gasification of fuel were proceeding on right lines. From the newspapers that day it would be observed that an effort was being made to boost-up the Airdrie housing scheme. The main they were using there was a steel pipe with a welded joint. He would definitely recommend this type of main, particularly in the initial stages of any district housing scheme.

Mr. Alexander Wilson (late Gas Engineer to the City of Glasgow) said so far as the coal question was concerned, he was afraid that little if any progress was being made. He was bound to admit that the later years of his management in Glasgow had been very difficult times with regard to coal supplies; and it was quite evident that things did not appear to improve in this respect. There seemed to be something radically wrong with the Government's management of the coal supply when it was being shown that very often material was being sent out to industries where it was of little use. A system of this kind really meant that the loss, not only to the consumers but to the country generally, was enormous. The root of the whole difficulty appeared to his mind to be that at the very outset the consumers were not represented on the Coal Committees. In existing circumstances, the coal-owners themselves were bound to see that they were losing a good deal of money.

The Convener at this point introduced to the meeting Mr. Legat, of Coatbridge, who, he remarked, had a very close relationship with the gas industry in Scotland. By his intimate knowledge of current municipal affairs, Mr. Legat was proving of invaluable assistance to the gas undertakings in Scotland.

Mr. Legat said he had put into writing the opinions he was desirous of giving expression to regarding the demands of the gas-workers and other organized employees identified with the industry. It seemed to him the course he ought to pursue was to hand over his notes to the Convener at the close of the meeting, leaving him to make whatever use of them he thought prudent and judicious. [These notes will be found reproduced at the end of the discussion.]

Mr. John Richmond (Penicuik) said an interesting point was opened up at this juncture, whether the actual consumer had benefited anything at all by the developments, or so-called developments, in the gas industry since the war. Whatever they did, they must not neglect the consumer. From his own personal experience, he could say that, although gas in the old days was dearer than at present, the bills were not so large as they now were, simply because consumers had to use more gas now in order to get satisfaction. While it might be the case that the average consumer obtained a better light than in the days of old, this was not due to any betterment or improvement in the process of manufacture. He rather had the feeling it was traceable to the improvements in burners and appliances.

Mr. Chas. Fairweather (Kilmarnock) ventured the opinion that no business man in the country had done less in the way of profit-making than had been the case in the gas industry.

Mr. David Vass (Perth) said he felt they were all indebted to Mr. Legat for the clear exposition of their views that had been given by him. They appreciated his work on the National Gas Council and the Wages Board. If the motion was in order, he would be prepared to move that the meeting should agree to support Mr. Legat in the position he was taking up.

The President said he felt all present would not be lacking in their appreciation of the services rendered by Mr. Legat. He had all the questions at his fingers' ends; and they could only give expression to their appreciation of his efforts and services on their behalf.

The President then passed on to refer to a few of the points that had been raised in the discussion. From the samples submitted and from the explanatory data furnished by Mr. Hislop, they had been able to see what could be done with an ordinary vertical retort. They had learned something from the discussion that day. Whether, however, they ever got to the ideal that some people had, of manufacturing gas of 200 or 150 B.Th.U., came to be a different story; and he was afraid a revolution would be necessary before they could count on the universal adoption of that ideal. By peaceful persuasion it was possible they might get down to 200 B.Th.U. In proceeding along this way he had the feeling they were on right lines; and it seemed to him they should endeavour to put their heads together and develop this side of the question. Some of their friends on the other side of the Border had the idea of selling gas on tap. This he rather feared was an ideal of the millenium; and he did not think it would come in the day of those present at the meeting. In the discussion, Mr. Braidwood had given them some interesting particulars of the gasification of coal in two processes; while Mr. Lawrence Hislop had confined himself to one process. Undoubtedly, there was a lot to be said for both processes. In his contribution to the discussion, Mr. M'Lusky had made him feel that his address on the subject of naphthalene ought to be rewritten. Mr. Vass, on the other hand, mentioned that he had reduced his naphthalene by spraying. They were pleased to have Mr. Alexander Wilson among them. They did not wish him to sever his connection with the industry or the profession, although he was now taking no active part in the manufacture of gas.

On the motion of the Convener, the President was thanked for his address.

The Convener's Resignation—Future Policy.

The President said the next business before the meeting was to consider the decision and wish of Mr. Napier that he should retire from the convenership of the Informal Meetings.

Mr. Napier said he had carefully considered the continuance of the convenership; and he had decided to resign just for the purpose of giving way to others. He had felt it a great pleasure and a great

honour to be associated with these meetings. The memories of his connection with the Informal Meetings took him back to the time when his late father was the last Secretary of the West of Scotland Association before it was amalgamated with the North British Association. The amalgamation effected at that time was the reason for the inauguration of the Informal Meetings of Scottish Gas Managers. He had no intention to dwell further on the point; but he should like to put it to those present at the meeting whether they were not prepared to proceed to the appointment of a new Convener.

The President said it was with great regret he noticed from the card convening the meeting that Mr. Napier proposed to send in his resignation. Mr. Napier had convened these Informal Meetings for something like eight years; and if the truth were known, he had done so on some occasions although he had himself been considerably out of pocket. They were indeed much indebted to Mr. Napier for the interest and enthusiasm he had shown in this work; and he would like to accord a hearty vote of thanks to the retiring Convener. [Applause.] The question arose now whether they ought to elect a new Convener in room of Mr. Napier, or whether the annual Informal Meeting of Scottish Gas Managers ought not to be merged in the activities of the North British Association of Gas Managers. As was well known, the North British Association held annually one meeting in the autumn; and it was a point worth considering at this stage whether an Association of the magnitude of theirs ought not to have more than one meeting in the course of the year.

Mr. R. W. Cowie (Port Glasgow), speaking as President of the North British Association, said if it was proposed to continue the Informal Meeting under the ægis of that body, it must be on the distinct understanding that the April gathering retained pretty much of its informal character. There was no doubt Mr. Napier had done a lot of work, and been out of pocket to some extent in connection with the meetings. Within recent years a voluntary collection had been taken at the Informal Meeting to defray expenses; and to some extent this would have relieved the Convener of some amount of financial loss.

Mr. James Bell (Dumbarton) pointed out that many attended the Informal Meeting who were not members of the North British Association, but rather of the Waverley Association. He thought it ought to be perfectly understood that members of the Waverley Association could attend the Informal Meeting as hitherto.

After a further exchange of views, it was decided to merge into the North British Association of Gas Managers; and the Informal Meetings are now to be regarded as the informal spring meetings of the Association.

Notes by Mr. A. S. Legat, of Coatbridge.

The following are the notes on the demands of employees which, during the discussion, Mr. A. S. Legat, the Chairman of the Coatbridge Gas Company, handed to the Convener of the meeting: As a rank outsider I am pleased to be with you to-day, and to be able to join in congratulating and thanking you, Mr. President, for your very excellent and well-thought-out address, which I am sure was not prepared within the limits of an eight-hour day, and the overtime was not paid for even at ordinary rates. I will not presume to make any remarks on the address—not for want of will, but for lack of ability and technical knowledge. Moreover, anticipating that I might be asked to say something to you, I have made some notes which I think ought not to be reported unless you so desire when I have finished, in which case this paper will be handed over to your Convener for disposal. This being an informal meeting, I suppose practically any subject may be touched upon. Although informal, this meeting is very fairly representative of the best part of the employment side of the gas industry in Scotland, and presents a very opportune and fortunate chance of putting my subject before you and obtaining your opinions thereon. While some of you are possibly not connected with, or members of, the National Gas Council (as you all ought to be), still you will all be more or less bound by any arrangements come-to by the Council on a national basis. This subject is that of holidays and overtime rates in your industry; and, as no doubt you are all more or less aware, the question has become somewhat acute recently. The Federation of General Workers have claimed for all workers in the gas industry as follows, but stated shortly:

For Shift Workers.—Fourteen days' holiday per annum, with pay.

For all Other Workers.—Twelve days' holiday per annum, with pay.

For Week-End Overtime.—Double time for shift workers for 24 Sunday hours, or three shifts.

Day Workers Overtime Rates.—Certain increases.

For all Workers.—That all statutory and declared holidays be paid for at the rate of double time.

These matters have been under discussion for some time by the Joint Industrial Council. But Scotland has not been represented in the flesh at these discussions—this for reasons known to, and appreciated by, your District Committee. However, as your representative, I put my views in writing before the Manager and Secretary of the Employers' side as follows:

Annual Holidays.—Scotland objects to any extension of annual holidays with pay beyond the seven days already generally allowed, and the more so as in practically no other trade or industry in Scotland are any holidays whatever allowed with pay. This also applies to six days as regards other than shift workers.

Week-End Overtime.—Scotland objects to any increase in this beyond the time-and-a-half now generally paid. I stated that, given double time, men would lie off work during the week one or more days and still have as many days' pay and as much money as most of them seemed to have any need or proper use for. I also stated that any number of men could be obtained for Sunday work, while there was difficulty in getting them on other days, especially on Saturdays.

Day Workers' Overtime.—I also objected to any increases or alteration in these overtime rates.

Statutory Holidays.—I stated that in Scotland we have no such holidays recognized in any of the industries, and that Scotland would not adopt, or have forced on her, any such English holidays, even for the sake of a national settlement. I also stated plainly that this question ought to be settled regionally and not nationally, as the circumstances and conditions in Scotland were so very different from those in England. I likewise asked, Do the parties realize what these demands, if granted in full, really mean—viz.:

14 days' holiday annually with pay	14 days' pay.
50 Sundays at double time in place of time and half	25 ,,
6 statutory holidays at double time	6 ,,
	45 days' pay.

In all, or over a whole year, something like the equivalent in time of 123 p.ct. and in wages of about 11s. per week, to each man working full time as a shift worker, and proportionally more to those working irregularly. And for this no value whatever would be received in the shape of actual work, or in fact of any work at all.

These are my views which I have put forward as your representative, and in what I conceived to be the best interests of the gas industry in Scotland. I shall be glad if you will now criticize, tear to pieces, or homologate them as you may see fit, and thus strengthen the hands of your District Committee and representatives in their future actions on your behalf.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Meter Works of Messrs. George Glover & Co.

A muster of upwards of sixty members of the Association for a week-end visit to works, is, even in these days of big figures, convincing evidence of zeal, and of a desire to inquire into things concerning the profession to which they belong. Such a number assembled on Friday afternoon, at Royal Avenue, Chelsea, for an inspection of the Ranelagh Meter Works of Messrs. George Glover & Co., Ltd. It was the third visit of the Association to the works; the two previous ones having taken place in 1907 and 1914. Thus while many were led there on Friday by anticipation, many others were induced to go by experience; and all were rewarded. Everything was so arranged as to afford the greatest possible scope for the acquirement of useful knowledge; and to this scheme the whole of the staff lent wholehearted support. Work was in full swing; and the complete cycle of operations was laid bare for inspection. Questions freely put were as freely answered; and the time spent in the various shops was ample to permit of careful examination of all the processes.

The members, with the President (Mr. S. B. Chandler), having assembled, they were accorded a hearty welcome by Mr. Albert Glover. Among so much that remained the same, there was one change on this occasion compared with the last which the visitors regretted—namely, that Mr. J. W. Glover (Mr. Albert Glover's father), who has meanwhile retired, was not taking part in the function. Mr. Glover explained that he had hoped to have with him Mr. H. M. Thornton, who was Managing-Director of the Company, as well as of the Richmond Gas Stove and Meter Company, with whom Messrs. Glover amalgamated twenty years ago. Unfortunately, however, Mr. Thornton had been detained elsewhere on important business, and had asked him to offer apologies for his absence.

Mr. Glover, in the course of his welcome, congratulated the Association on their interesting session's programme, and expressed the hope that the visit to his firm's works would prove to be not the least valuable item. On the occasion of the last visit, he went on, many empty benches were noticed, owing to men having enlisted for the war; but now all the benches are full, and the Company can barely keep pace with the work of repairing meters, which are pouring in daily from all parts of the kingdom. The Glover branch of the combined businesses is the older of the two, having been founded in 1861 (just after the passing of the Sales of Gas Act), by Mr. Glover's great-uncle, Dr. George Glover. His first work, before launching-out into the manufacture of dry meters, was the designing and building-up of the standard test gasholders for the Standards Department, at the request of the Astronomer Royal. He also designed the cubic foot measure; and all this apparatus is still in use at the Standards Department of the Board of Trade. Mr. Glover related that he lately had occasion to call at the Department, and admired the good order in which all the holders are kept. They asked him to let them have a portrait of Dr. Glover, so that they might include it in their collection of men who have been of special service to them.

Mr. Glover explained that, since the standard holders were completed to the satisfaction of the Department, the firm have devoted themselves entirely to the production of the dry meter. Thirteen years ago, they designed and built-up the largest dry meters in the world—two 3000-light meters for use with very large gas-engines. These, he believed, are still working satisfactorily, as the firm have never had any complaint regarding them. As is well known, their manufactures have been included in all the principal international exhibitions; and they have received medals and certificates, to which the attention of the visitors was drawn. When automatic meters came into use, Messrs. Glover brought out some of the earliest successful patents; and their change-wheel attachment was adopted by the South Metropolitan Gas Company as their standard. The firm supply them with large numbers of these mechanisms, in addition to complete meters.

As a result of experience during the war, the firm hope soon to place on the market a new prepayment model, fitted with an attachment for changing the price *in situ*; and, Mr. Glover said, they believe this will be even more popular—if that were possible—than their present pattern.

Speaking of the inspection about to be made, Mr. Glover remarked that he would particularly like to call attention to a 1000-light meter which had been opened for repair, and in the bottom of which the products of condensation from the gas were lying in buckets full, and preventing its satisfactory working. This was due to the meter being fixed in a very cold situation. It had only been out two years, and had no mechanical fault. It cannot, he explained, be too often pointed out that meters should be fixed in a dry and fairly warm situation. They are tested at 60° Fahr.; and if in actual practice they work at a lower temperature than this, the gas company are the loser, as the meter registers slow. The further ill-effects of the cold are shown in the object-lesson provided by the 1000-light meter referred to. He also mentioned that the factory is lit by gas, the presses and lathes run by gas-engines, and the tinmen's stoves (which are made on the premises) served by gas and compressed air—the compressor also being driven by means of gas.

Divided into parties the inspection was then proceeded with, every assistance in affording information being given by Messrs. Glover, Lyon, Wicks, Pratt, Green, C. & W. Staples, Perry, and Clark, as well as by the employees generally, who were frequently called upon to explain some delicate or intricate operation being carried out by them. In turn, the nine different departments were visited. As has already been explained everything in the works is connected with the manufacture of the dry meter, and the members were shown the process, from the pressing-up of the tinplate forming the case, and the making of the white metal and brass fittings, including the attachment and index, to the assembly of the parts and the testing of the finished article. As an example of the different parts manufactured, attention was drawn to a case containing the various parts (180 in all) required in the manufacture of a three-light prepayment meter—the whole of which are produced on the premises. There were visited the press shop, the index and general brass shop, the automatic shop, the leather shop, white metal foundry, paint shop, and testing room, as well as the assembling and repair shops in the main building. In the paint shop the parties had an opportunity of judging of the efficiency and rapidity of the spray method of painting meters. The works are on three floors; but Mr. Glover explained that the firm are hoping, when their lease runs out, to build more commodious premises on one level. This will make for greater efficiency, and enable them to turn out still more work even more promptly than they can do at present.

After a pleasant interval had been spent in tea and conversation, the President said they must voice their thanks to Messrs. Glover & Co. for their hospitality. In the manufacture of gas-meters, a great deal of technical knowledge was required; and they must all have been struck by the accurate manner in which the work was carried out. Another thing that had appealed to him was the spirit of contentment which appeared to pervade the works, and the number of years that very many of the men had been in the service of the firm. This was high testimony to the way in which the Company treated their employees. Modern methods had as far as practicable been brought into use throughout the works in the manufacture of meters; and there was no doubt the firm would have a very busy time in the near future, not only in repairing meters, but in constructing the new meters which would be required in connection with the large number of housing schemes on foot. In his own district, for instance, many of these houses would be erected; and it could be assumed that each one would require a gas-meter.

On the proposition of Mr. G. H. Lloyd (Gas Light and Coke Company), seconded by Mr. W. Payne (Commercial Gas Company), a hearty vote of thanks was passed to the firm, to Mr. Glover, and to all who had contributed to make the visit the success it had been. In acknowledgment, Mr. Glover declared that it had been a great pleasure to them to have the members there. He extended an invitation to the Association, on behalf of Mr. Thornton, to visit at some future time the new show-rooms in Queen Victoria Street of the Richmond Gas Stove and Meter Company—an invitation of which the President said the Association would be very pleased to avail themselves.

Seventh Annual Dinner.

An unqualified success was the seventh annual dinner of the Association and concert, which took place on Saturday evening at Anderton's Hotel, Fleet Street, E.C., when a party of considerably over a hundred sat down. Mr. S. B. Chandler, of the South Suburban Gas Company, presided; and among the guests were Mr. A. F. Browne (who had been present on previous occasions), Mr. J. Terrace (the Chief Engineer of the South Suburban Gas Company), and Mr. T. Curr (Engineer of the East Greenwich Station of the South Metropolitan Gas Company). An enjoyable programme had been prepared; and to those who contributed to it (as well as to the Stewards, Messrs. J. Hewett and Mr. L. W. Worth) cordial thanks were expressed. Interspersed among the items were some speeches. After honouring the Loyal Toast,

Mr. A. F. BROWNE proposed "The London and Southern District Junior Gas Association." He remarked that the Junior Associations, who totalled a membership of something like 1100 (the London and Southern Association having the largest number of members), were doing a great and lasting work for the future of the gas industry. The spirit displayed by them had evoked a general feeling of sympathy and respect. Gas-works were thrown open for inspection; and it was the same with the works of apparatus manufacturers. The quality of the papers read before these Junior Associations was really excellent. Technical education was growing in importance every day; and in all industries the rising young men must be properly educated. Helping towards this end in the gas industry there were many agencies, including a splendid Technical Press; but in front of all he would certainly place the Junior Associations. He would like to compliment the Executive on the excellent programmes they were able to provide. It ought to be known that the President and other officers—all who were left—had remained in office throughout the whole period of the war, and had successfully kept affairs going.

Mr. F. J. PEARCE (Senior Vice-President), in response, said Mr. Browne's kind references to their work were thoroughly appreciated. Their hearts were in their work; and they hoped to carry on in the future even better than they had been able to do in the past.

Mr. D. J. WINSLOW submitted "The Ladies and Institution of Gas Engineers," and voiced the gratitude of the members of the Association for the privilege so readily accorded them by seniors of going over the different works. To the first part of the toast, Mr. F. A. Frost (the Hon. Treasurer) replied.

Mr. J. TERRACE, responding for the Institution of Gas Engineers, said he was very pleased to be present to support the President, who was in the service of the Company with which he himself was connected. He was also glad in this way to show his sympathy with the Junior Associations. While Mr. Browne was an old and tried friend of theirs, he (the speaker) was practically a stranger to them. He had been a member of the Institution of Gas Engineers for some seventeen years, and had for the last few years served on the Council; but, of course, any remarks he might make could not be taken as coming from them officially. He had always taken great interest in the work of the Junior Associations. This work was looked upon by the Senior Associations with very great favour and with very great hope. The value of the papers read was generally recognized; and for quite a number of years he had used the "Transactions" of the Juniors for reference every bit as frequently as he had those of the District Associations and of the Institution. More especially was this the case in regard to that very important part of their programme, the visits to works. If one wished to glean information as to what was being done at the different works, it was mostly to be found in the "Transactions" of the Junior Associations. The paper submitted at the very last meeting of their Association showed how much work could be put into a contribution of this character. If in the future there was any way in which he could help the Association, he hoped they would not fail to call upon him.

Mr. J. HEWETT, proposing "The President," pointed out how old the name of Chandler was in connection with the gas industry. Their President was worthily upholding the traditions of his forefathers. He had held office with great success during a very difficult period; and they were sorry his term was coming to an end. The Association had now a record membership.

The PRESIDENT expressed his appreciation of all the kind remarks that had been made concerning him, and pointed out that thanks were due to the other officers and to the members for having helped to keep the Association going, at a time when everybody was overworked, and everything was difficult. He had been loyally assisted all through.

Mr. G. H. Lloyd proposed "The Hon. Secretary;" and Mr. GEORGE WINSLOW responded. The toast of "The Press" was given by Mr. W. J. LIBERTY.

Full Utilization of Existing Equipment.

Discussing some important gas administration problems as they affect undertakings in the United States, Mr. L. W. Alwyn-Schmidt, writing in the "American Gas Engineering Journal," says the difficulty of obtaining new equipment should induce companies to definitely ascertain first of all whether they are making really 100 p.ct. use of that which they already possess. The European Continental Gas-Works saw themselves faced during the war by an enormous increase in the demand for new installations coming from industrial consumers who had to be supplied at any cost. At the same time very serious shortage arose in the supply of equipment. Incidentally, much of the existing equipment went out of actual use, because the owners of smaller factories closed-down; and a large part of the domestic equipment was also not needed. The German gas-works started comparatively early to take this dead equipment, and put it to new use. Meters and lighting fixtures were removed from old places, and fitted elsewhere. This equipment was already paid for; and it was certainly more economical to employ it than to let it remain unused as a charge upon the gas-works. Much waste takes place in the United States, he adds, in the case of practically all but the best served plants in the distribution of the manufactured product. It can be stated without exaggeration that only 60 p.ct. of the distribution equipment is to-day in actual use. There are many miles of trunk mains in America which serve a small number of customers only. These mains deserve special attention. Cases where additional supplies are needed in the neighbourhood of one of these partially-used mains are very frequent. Would it not, in such instances, be better policy to connect the less-used main by a well-placed side line, instead of laying a new main along another route that may only too soon operate under the same condition as the other?

At a meeting of the Illuminating Engineering Society, to be held at the Royal Society of Arts next Tuesday evening, a discussion on the "Lighting of Churches" will be opened by Mr. J. Darch.

ALLOCATION OF GAS-WORKS MANUFACTURING COSTS.

INAUGURAL ADDRESS OF MR. JAMES BRIDGE, OF BOLTON, TO THE MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Gentlemen,—I thank you most cordially for the honour and confidence you have reposed in me by electing me President of the Association. It is an honour I highly appreciate, and more so when it is remembered that the Association is the premier of the Junior Gas Associations.

The first meeting was held on Nov. 5, 1898, when the first President and Officers were elected, and eighteen members were enrolled. The inception was a happy one, and accompanied with success. By the end of the first session, the membership had increased to forty; to-day our membership has reached the high mark of 178. Activity, usefulness, and progress have always been the motto of the Association. Only two years after the formation, we find the Council recommending to the City and Guilds of London Institute a reorganization of the examinations held in "Gas Manufacture," and it is pleasing to know that these recommendations were not fruitless.

The subject of education has, undoubtedly, had peculiar fascination for the past and present officers of the Association. The Saturday afternoon and mid-week lectures which were held at the Manchester University were the outcome of pioneer work done by the Association. Of recent years, through the initiative of the Council, a systematized scheme for the education of junior gas engineers has received very careful consideration by a Sub-Committee of the Institution of Gas Engineers and the Joint Council of the English Junior Gas Associations, which scheme should, when completed, be a valuable asset to the gas profession.

The Council, during the last twelve months have taken an active part in the formation of the National Association of Technical Gas Officials. Undoubtedly, I have just cause to feel proud in occupying the chair of such an active and prosperous Association.

The preparation of a Presidential Address calls for very careful thought. During the last five years our energies have been centred on conditions imposed on us by the war. We have left behind many of these difficulties; but, unfortunately, the question of coal and coal supplies is one still remaining with us. Not only does this affect the members of the Senior Associations, but also the members of the Junior Associations, as more often than not it falls to the lot of those who form the latter Associations to overcome the practical difficulties. Many interesting and instructive papers could be read on the difficulties and troubles which have had to be faced as a result of inferior coals; and we should be happy to have a return to coal with 33 p.ct. of combustible volatile matter and 5 p.ct. to even 10 p.ct. of ash. Despite all the difficulties, the Junior Associations have made progress, but there is still ample room for further progress. During the coming session, I trust our Council will be able to arrange for at least one meeting at which short papers can be read dealing with everyday questions of a gas-works, when the youngest of our members will have the opportunity of taking the principal part.

Numerous papers have been written on benzol extraction, steaming as practised in vertical and horizontal retorts, with subsequent discussions on low-grade gas; and latterly papers have been read dealing with the new standard for gas sales. As these have appeared in the Technical Press, you will be well acquainted with them.

To bring before you a new subject, and one which will be useful, presents some little difficulty. However, I venture to introduce a subject not usually dealt with by Junior Associations, but one which is of considerable importance.

ALLOCATING MANUFACTURING COSTS.

It is with a considerable feeling of trepidation that I bring forward the subject of the "Allocation of Manufacturing Costs." This in the past has been solely confined to our seniors; but it is a subject which has occupied a portion of my time, and one which, sooner or later, must be very familiar to all members who aspire to the chief administrative positions in the profession. I may be forgiven for saying there is no time more suitable than the present to turn our attention to this and similar financial matters. In many cases, the allocation of wages and costs, and estimates of expenditure and income, are carried out solely by the manager, the secretary or accountant, or the secretarial staff, and the junior only sees the finished product; whereas it is the knowledge of the details comprising the statements which is essential to enable him successfully to fill the finally coveted position with credit to himself and the profession.

While acting as Secretary to the Association, it fell to my lot to canvass many of the members for papers. One could not help thinking that the practical side of the profession received all (or nearly all) the attention, and only a superficial knowledge was obtained of the clerical duties which devolve on the chief administrator. This is undoubtedly a deterrent to the true advancement of the profession—particularly so in the small and medium sized works, which are usually the first administrative positions occupied by the juniors; and as the junior of to-day will be the senior of the morrow, it is very essential for us to seize time by the forelock, and now to study carefully matters comprising the financial side of the profession. If my little effort this afternoon will give rise to and stimulate consideration of such subjects—even though my information is very meagre—some good will certainly have been accomplished.

In these days of high labour charges, it is essential to be well acquainted with all the manufacturing charges which are accruing each day, and to have these charges fully analyzed more frequently than they have been in the past. This should be at least once per month, but better still every week. In the past it has been sufficient to have an analysis of accounts yearly or half yearly. More progressive undertakings have had an analysis of accounts oftener; but the time is opportune for greater activity for all. Undoubtedly, it is beneficial to keep a frequent record of the detailed manufacturing charges and maintenance costs. Such information is easily obtainable from a good system of working, and provides the management with all that is necessary to detect and check waste.

The first consideration is the time-recording of all employees. This can be satisfactorily accomplished by any of the recognized clock recording devices, which remove the disputes frequently arising under the old check system, and further give a true record of any over or week-end time worked.

The next item is a true allocation of the time worked, which presents greater difficulty. In some works we find the allocation of time is left largely in the hands of the store and time keeper or wages' clerk; and the time is allocated from what they see or have reported to them. The disadvantages of such a system are apparent, and give rise to a false allocation of time, which nullifies the accuracy of the balance-sheet, though not affecting the cash balance. A more correct record can be given by the works or yard foreman, who is in constant touch with the general labourers on the works. Such being the case, the foreman daily certifies the time-sheets as being a true record, or he daily supplies the wages' clerk with an analysis of the time of all men under his supervision. Very little of the foreman's time is occupied in carrying out this work; and further, the accuracy obtained shows it to be fully justified. I am of opinion that some of you would receive a little surprise if you, for one week only, carefully followed out the allocation of every man's time engaged at your works.

The case of the artisan or tradesman is somewhat different. Each day he fills-up in detail his weekly time-sheet along with that of his labourer, and at the same time records on the back of his time-sheet or card the material used. With simplification, very little time is occupied in doing this; and it is fully warranted by a true allocation of time and material used on each job. In some cases the storekeeper allocates the material as it is issued; but this alone is not sufficiently accurate where a floating stock is kept in the various workshops. It is, however, quite good for the allocation of general stores issued.

Unfortunately, in the gas profession there is no detailed standard for the allocation of manufacturing charges; and it is impossible to compare the detailed working of different undertakings. The five dissections named under Schedule B of the Gas-Works Clauses Act, 1871, for "Manufacture of Gas" do not permit detailed comparison.

The "Gas World Analysis of Accounts" is a store of knowledge, exceedingly interesting and undoubtedly of great value; but when, from various reasons, all the manufacturing charges are grouped under a few headings, the advantages which would be gained by a detailed comparison of the various methods of working are entirely lost. It may be argued that the figure "Net Cost of Gas into Holders" is all that is necessary; but a study of detailed costs would be beneficial. One is reminded of the old adage "Take care of the pence and the pounds will take care of themselves."

Let us consider the case of carbonizing wages with which we are all familiar. Even in this process (practically common to all gas-works) the items charged to this account vary. Let me cite one or two of the differences. Some undertakings include all coal handling in carbonizing wages; others will include the conveyance of coke from the conveyor or retort-house skips to the coke screens or storage, by telpher or other means; while still other undertakings will only debit to carbonizing a portion of the exhauster and boiler attendants' time.

The table below gives the comparative cost of the various operations mentioned:

Coal handling, including breaking and conveying	0·45d.	per 1000 c.ft.	made.
Carbonizing wages (retort-house only)	2·04d.	,,	,,
Telpher attendants	0·22d.	,,	,,
Exhauster and boiler-house attendants	0·43d.	,,	,,

From the above, the carbonizing wages per 1000 c.ft. of gas made can be taken at a minimum 2·04d. or maximum 3·14d., which certainly prevents any true comparison being made, unless it is definitely understood what charges are included. We can further easily see that, through taking the several items in one total, the advantages to be obtained by a certain system of coal handling, carbonizing, or coke handling, cannot be appreciated to their full value. The "Gas World" for March 6 published the analysis of accounts for eighteen undertakings; and we find wages (carbonizing) vary from 1·94d. to 8·07d. per 1000 c.ft. sold. It is hardly possible that the allocation of costs is the same in all cases mentioned. At our works, carbonizing wages commence immediately the coal is emptied into the breaker (prior to that, the charge is "coal handling"), and extend until the coke is deposited into the screens or stock. Further handling of coke is charged to "coke account." [Fuller details of allocation are given in a later portion of this paper.]

Repairs and maintenance of works and plant is another charge which warrants more detailed analysis. The information so obtained, besides being of value for comparison, should be highly beneficial to those in charge of works. The varying allocation of wages and maintenance affect the figures representing the net receipts from residuals. True, the differences are small; but they, nevertheless, affect the accuracy of the figures.

Without further elaboration, it is evident there are considerable differences taking place in the allocation of costs. It is readily admitted that all gas-works are not similarly equipped; but there is no reason why greater uniformity should not exist as to wages allocation, which would allow a more detailed comparison of working costs—bringing fully into prominence the advantages to be gained by certain systems of working, and further pointing-out the plants that are not working or will not work economically.

The cutting-down of one charge at the expense of another has support in some works, seeing that the total expenses amount to the same figure; but it is undoubtedly wrong, and does not tend to elevate the profession, which should be the object of each one of our members.

Those whose pleasure it has been to be engaged by undertakings carrying out extensions realize how many questions there are which come forward for consideration. Not the least of these is "What are the working costs?" At present, to make a comparison of the working costs of the various carbonizing plants necessitates a circular-letter requesting detailed information, or an inspection of the plant has to be made to ascertain the actual carbonizing costs. Some time ago, I had occasion to compare the carbonizing costs of another town with those of Bolton; and the comparison was remarkable for the disparity which existed. But when it was ascertained what items had been charged to carbonizing, and the two works placed on the same basis, the results were practically identical. A standard detailed form of allocation would promote a more reliable comparison of working results; and this should be an incentive to those whose charges are high to improve their conditions. If one undertaking has plant which gives a higher efficiency in working than the average, a detailed analysis of accounts would give it the merited prominence, and this should prove beneficial to other engineers.

A factor affecting economical working is where an undertaking has two or more works, which are on greatly reduced output during the summer months, or where one of the works is shut-down for the summer months. In this case the stand-by charges play an important part in the undertaking's cost of production. More economical working can undoubtedly be obtained where a works has continuity of manufacture.

The table below is a summary of the headings under which our wages at the works are allocated, with some in detail—not complete, but illustrating the principle.

Consideration has been given to the allocation of several items where ambiguity exists; but with changing conditions, and the smallness of these ambiguous charges, the allocation gives a reliable account of our various operations. The responsible official should, at frequent intervals, make a detailed survey of the allocation of wages. Changing conditions necessitate a fresh allocation in some cases; and, unless a proper check is kept, it often happens that "sundry wages" are debited with considerably more expense than is justifiable.

Our wages are fully analyzed every week; and the cost of each item per 1000 c.ft. of gas made is calculated. This may appear an elaboration; but I can assure you that it is helpful to obtain a higher efficiency, and can up to a certain point be made to pay over and above for the time it takes. With changing conditions of coal and method of working, very useful information has been obtained as to the cost of each operation per 1000 c.ft. of gas made; and the detailed figures giving manufacturing costs of gas into holders are carefully watched each week and every month of the year. I admit that to obtain the above information costs money; but I maintain that the manager, who intends to make and sell good gas at a cheap rate, and improve working conditions not only for the undertaking but also for the employees, can, with assiduous attention, obtain results which will amply repay the cost of time that must be devoted to obtaining this detailed information.

COSTING OF WORK.

Another matter which I bring forward for your consideration is the costing of work. This is a further allocation of wages; but it also includes the cost of materials used. The Birmingham Gas Department have a very comprehensive system of costing; and every member of this Association would be well repaid by carefully studying the lecture on "Costing as Applied to Gas Undertakings," delivered to the London School of Economics and Political Science by Mr. Edward Cooke, the Accountant of the City of Birmingham Gas Department. [See "JOURNAL," Vol. CXLIV., p. 260.]

It is not practicable for small or medium-sized undertakings to have such a system in operation; but it is readily possible to adopt a scheme whereby all materials are correctly accounted-for and charged-up to the work on which they are used. The costing system in operation at Bolton is not so extensive as that at Birmingham; but it nevertheless deals with practically each individual item of the whole works. A costing system to be of real value must produce the results immediately the work is completed, and must be made use of by the official in charge of the works, and not simply filed away for reference.

There are numerous small difficulties which present themselves in the initial stages, when introducing a costing system; but it is surprising how, by careful attention, these can be readily overcome, and the system gradually extended until a correct record of the cost of time and material is obtained in detail for practically the whole of the work which is being carried out. One may ask, "What are the advantages to be gained by instituting a costing system?" From personal experience, I can tell you they are considerable—providing that the information is made use of. One may have a perfect costing system; but unless the results obtained are utilized by the responsible official in charge of the works, the money spent on it is simply wasted.

How many of our members know what it costs to empty and refill a purifier, or the annual maintenance of a gas-engine, a liquor pump, a charging machine, a coal or coke conveyor, or even how many gallons of oil are used every year on the conveyor? A costing system in the hands of the responsible official in charge of the works supplies all this and other information; and from this he should indeed find it possible to effect still more efficient working.

The costing of work done in detail is a matter which has been neglected in the gas industry. Its introduction by some undertakings has brought to light many cases where the working has not been economical; and it has been proved a decided advantage to know the detailed cost of repairs, &c., week by week; to know the income each cart and horse or motor is bringing-in per journey, or per day; and many other similar questions.

Here is an opportunity for the juniors of the profession to obtain

TABLE SHOWING DISSECTIONS UNDER WHICH MANUFACTURING WAGES ARE ANALYZED.

COAL HANDLING.
Emptying coal wagons.
Stacking or removing coal from stock, including cartage.
*Part capstan men.
*Part locomotive driver and shunter.
*Part boiler attendants.

NOTE.—*The proportions are not stated to-day, as these vary at either of our works, due to different systems being in operation.

CARBONIZING.
Breaking, elevating, and conveying coal.
Foremen stokers.
Machine and coke skip attendants.
Pipe jumpers.
Furnace men.
Vertical retort attendants.
Flue cleaning.
Scurfing and patching retorts (hot).
Greasing retort house machinery.
Cleaning the hydraulic mains, and seal pots.
Heating-up retorts.
Telpher attendants.
Exhauster attendants.
*Part power house attendants.
* ,, boiler men.
* ,, general foreman.

*Note as before.

COKE.
All labour in connection with coke after being deposited by telpher.
Cartage of coke.
Part locomotive driver and shunter.
Part capstan men.
Part power house attendants.

PURIFICATION.
Discharging oxide from wagons and loading wagons with spent oxide.
Filling, emptying, and refilling purifiers.
Elevating, disintegrating or turning oxide.
Running off nozzles.

REPAIRS CARBONIZING PLANT. RETORTS.
Repairing and rebuilding retort-stack.
Patching retorts (cold) and repairs.
Unloading fire-clay goods including cartage.

REPAIRS CARBONIZING PLANT, IRONWORK, AND TOOLS.
Repairs and renewals of all ironwork in connection with bench.
Repairs retort-house tools.

REPAIRS AND MAINTENANCE WORKS AND PLANT.
Mechanics and assistants repairing pumps, engines, exhausters, boilers, conveyers, telphers, motors, purifying house machinery, repairs to railways and buildings.
Part general foremen.
,, storekeeper's time.

WAGES (MANAGEMENT) MANUFACTURE ACCOUNT.
Railway and road weigh-bridge attendants.
Office cleaners and messengers.

WAGES (MANUFACTURE).
Syphonmen.
Cleaning on works.
Dining-room attendants.
Test plant attendants.
Valve men.
Part storekeeper.
,, general foremen.

S./A. MANUFACTURE.
Sulphate makers.
,, boiler men.
,, waste gas purification.
Loading, packing, and cartage of S/A.

S/A. PLANT REPAIRS.
Cleaning and repairing all S/A. plant, boilers, acid tanks, injectors, pipes, &c.

BENZOL MANUFACTURE.
Benzol plant attendants.
Loading tank wagons.
Emptying wash-oil tanks.
,, $C_{10}H_8$ tanks.
Part boiler men.

BENZOL PLANT REPAIRS.
Repairs stills, pumps, pipes, &c.

TAR.
Loading tank wagons.
Part capstan men.
,, locomotive driver and shunter.

HORSEKEEPING.
Maintenance of vehicles.

HOLIDAYS.
Allocated under respective headings and also under one item.

WORKS SALARIES.

Bolton Corporation Gas Department.

Lum Street Works. *Month ending March 31, 1920.*

MONTHLY STATEMENT.

	Gas Made. C.Ft. Corrected to 30" Bar. and 60° Fahr.	Per Ton of Coal.	Per Retort per 24 Hours.	Coal Carbonized per Retort per 24 Hours.	Average No. of Retorts in Action	Average Heating Value B.Th.U. Gross.	B.Th.U. per Ton of Coal.	Residuals per Ton of Coal Carbonized. Coke and Breeze Saleable. Cwt.	s. d.	Sulphate of Ammonia. Lbs.	s. d.	Tar. Gallons	s. d.	Benzol. Gallons	s. d.	Estimated Receipts from Residuals. Per Ton. s. d.	Per 1000 C.Ft. d.	Coke and Breeze per Ton of Coal. Made. Cwt.	Used on Boilers. Cwt.	Used in Furnaces Cwt.	Coke and Breeze Used on Furnaces. Cwt. per 1000 C.Ft.
March 31, 1920																					
Aggregate for year																					
March 31, 1919																					
Aggregate last year																					

	Coal. Received. Tons.	Cwt.	Carbonized. Tons.	Cwt.	Average Ash Content for Month. P.Ct.	Cost of Coal. Per Ton. s. d.	Per 1000 C.Ft. Made. d.	Less Residuals. Per Ton. s. d.	Per 1000 C.Ft. d.
March 31, 1920									
Aggregate for year									
March 31, 1919									
Aggregate last year									

	Stocks at End of Month (Tons). Coal.	Coke.	Breeze.	Tar.	Liquor.	Sulphate of Ammonia	Benzol.	Acid.
This year								
Last year								

	March, 1920. £	s.	d.	Per 1000 C.Ft. Made. Pence.	Aggregate for Year. £	s.	d	Per 1000 C.Ft. Made. Pence.	March, 1919. £	s.	d.	Per 1000 C.Ft. Made. Pence.	Aggregate Last Year. £	s.	d.	Per 1000 C.Ft. Made. Pence.
Coal handling																
Carbonizing																
Purification																
Repairs to carbonizing plant																
Repairs (works and plant)																
Wages (manufacture)																
Wages management (manufacture acct.)																
Coke handling																
Tar																
Sulphate of ammonia manufacture																
Sulphate of ammonia plant repairs																
Benzol manufacture																
Benzol plant repairs																
Horsekeeping																
Maintenance of vehicles																
Works salaries																
Cost of coal carbonized																
Wages and coal																
Wages and coal (less residuals)																

information, not only useful for themselves, but of financial advantage to the undertaking they serve.

MONTHLY WORKING STATEMENTS AND ANALYSES.

Another subject with which I found many of our members were not acquainted was the monthly working statement and analysis; and therefore I bring before your notice a form of report in use at our works. The information is easily obtained from the daily "Carbonizing Book and Weekly Wages Analysis."

These statements are made out month by month, with a comparison of the working for the same period of last year, and also with the aggregate for the current and past years.

The information obtainable from such reports, coupled with a costing of work, should enable any member who is placed in charge of an undertaking to prepare a concise and reliable estimate of the manufacturing expenditure he will have to provide for, and the income he may expect from his sales of gas and residuals.

I should be very pleased if some member would give us a paper this session dealing with the allocation of wages and the costing of work carried out in the distribution department.

Scientific and efficient management of a gas-works demands an intimate knowledge of every operation performed. The cost has also to be carefully followed; and the more detailed reliable information obtained carries with it every inducement to obtain the most economical working.

CHLOROFORM FROM COKE-OVEN GAS.

The "Chemical Trade Journal" reports that a sample of chloroform from coke-oven gas was exhibited at a recent Edinburgh meeting of the North British Branch of the Pharmaceutical Society of Great Britain; and a note describing the sample was read by Mr. A. J. Dey. The chloroform in question was produced as a bye-product in connection with the works of the Skinninggrove Iron Company. There was, said Mr. Dey, nothing new in making chloroform from ethyl alcohol; but the specimen was interesting as being the first that had been seen made from ethyl alcohol obtained as a waste product from coke-oven gas.

The coke-oven gas contained ethane, which under ordinary conditions was simply consumed in the combustion of the gas. By suitable arrangements, however, the ethane might be removed from the gas before it reached the burners. From this ethane as a starting point, ethyl alcohol was obtained; and from the ethyl alcohol the chloroform was produced by the usual well-known process. On examination, the sample responded to all recognized tests for pure chloroform of the British Pharmacopœia, with the exception that when evaporated there remained a characteristic odour which was reminiscent of an odour not infrequently observed when dissolving metallic iron in a dilute mineral acid. It was found that the sample could be freed from this impurity by treatment with sulphuric acid; and it seemed highly probable that it was a hydrocarbon or a mercaptan. It was hardly likely, concluded Mr. Dey, that coke-oven gas would become a source from which to manufacture chloroform, though it seemed likely to be a commercial source for the production of ethyl alcohol for industrial purposes.

Utilizing Waste Heat.—According to the "Ironmonger," an interesting article on fuel economy, with more special reference to the utilization of waste heat, was contributed by Dr. E. Reutlinger to a recent number of the "Zeitschrift für Dampfkessel und Maschinenbetrieb." The author estimates it is possible to save 25,000,000 tons of coal per annum in Germany by comparatively simple modifications of existing plants. He also calculates that the German collieries tipped 9,000,000 tons per annum of low-grade fuel upon waste-dumps during the war. Great importance is attached to the use of gas from coke-ovens; and it is stated that large gas-engines of 1000 KW. and upwards return their cost in two years when worked with these waste gases. It is true that blast-furnace gases are frequently utilized; but there are many furnaces used for other operations, where utilization of the waste gases has not yet been attempted. In the zinc furnaces of Upper Silesia an annual saving of 800,000 tons of coal is effected by utilizing waste gases, though only 20 p.ct. of the heat is secured.

DIMINUTION OF WASTE HEAT LOSSES IN WATER-GAS OPERATION.

By H. L. NICHOLSON, of the New England Fuel and Transportation Company.

[A Paper read before the New England Association of Gas Engineers.]

The best design of water-gas settings still permits an excessive loss of the heat generated, unless expensive auxiliaries are provided. Therefore, it is important that such loss be minimized as far as may be in the operation of the set itself. Efficient operation has mainly been understood to be the obtaining of the lowest fuel figures consistent with good oil results. It is hardly necessary to say that this index of efficiency still obtains. But there is also another equally important side to the question—namely, capacity or rate of make. This latter factor, of course, affects labour and overhead charges; and the last may be the largest item if the plant is pressed for capacity up to the point where additional installations seem necessary.

In regard to carburation, maximum efficiency with the apparatus at hand depends upon maintaining the necessary temperatures at the points in the carburettor and superheater. This maintenance is dependent upon secondary air admission and upon generator operation—that is, it is essential that only sufficient producer gas be generated by the primary blast and consumed by the secondary blast to effect the required cracking temperatures, without the ineffective burning of producer gas at the stack, and consequent heat loss. Oil feeds have generally been reduced from 4 or 4¼ gallons per 1000 c.ft. to 3 gallons or under. This has meant, under the usual running conditions, either an excessive temperature in the carburettor and superheater, with detrimental oil results, or loss in heat by combustion at the stack. The remedy for this condition lies in altering the generator operation, either by limiting the production of producer gas to suit diminished oil feeds, or by increasing the rate of make, and consequently the oil feed, to utilize the entire carburetting capacity of the set and the producer gas available.

An increase in capacity may be effected by an increase in the volume of primary air; but as this increment is proportional to the square root of the pressure and the length of the blow, and as both these factors are more or less utilized up to their practical limits with the existing apparatus, not a great deal is to be gained in this direction. Furthermore, increasing the rate of make alone in this manner may still result in an excess of producer gas over what is needed for carburation. It is necessary, therefore, to alter the generator operation by other means than, or in addition to, the above. This is best effected by altering the relative proportions of the up-and-down steam in the generator.

EXPERIENCES AT EVERETT.

At Everett, we had for some time been using 60 p.ct. up-steam and 40 p.ct. down. This method of running resulted in a fuel bed the middle half of which was of fairly uniform temperature; the bottom being slightly cooler, and the top somewhat hotter, except immediately after coaling. These are ideal conditions for the formation of CO, and the producer gas was highly burdened with it—so much so that, even with the heavier oil feeds used in the past, it was difficult to consume it all in the rest of the setting, while with an oil feed of 3 gallons or less it was impossible to prevent excessive waste of heat by stack combustion.

The even temperature fuel bed had always been considered the best condition for economic results. This method had also been dictated by the fire-cleaning practice. The fuel for a long time in use had been bye-product coke, having an ash fusion temperature of from 2250° to 2300° Fahr. This slagged-down from the generator walls and was deposited as a flat mat of clinker on the grates, where it was easily removed by the use of supplementary bars; no burning down of the fire and no barring down from above being required. The proportions of up-and-down steam were slightly changed from time to time so as to bring about this result according as the fusion temperature of the ash varied. While the proportions were changed, the total amount of both remained very nearly constant. Consequently, such slight changes as were made had a marked effect on the character of the clinker.

These conditions obtained in February, 1919, and, as already stated, had been the accepted practice for some time previous. In the following March, it became necessary to use as generator fuel coke of better quality, but having a considerably higher ash fusion temperature—that is, between 2450° and 2500° Fahr. Furthermore, upon fusion the ash was more plastic and less fluid than formerly. The immediate result was greatly increased difficulty in cleaning the fires by reason of the clinker solidifying and clinging to the generator walls above the cleaning door, where it could neither be removed from below nor dislodged from above. A few days of this and the generator had to be shut-down, cooled off, the fire drawn, and the clinker cut-out by hand from inside.

Efforts were then made, after a fresh start, to fuse the clinker down in the usual manner by increasing the ratio of up to down steam from 60 : 40 to 50 : 50. This attempt was successful; but the clinker mat was much too hot to handle, and the cleaning doors and frames became alarmingly hot. Keeping the same proportions of up-and-down steam, the total quantity was increased; and very soon a satisfactory cleaning was obtained, while at the same time the rate of make increased. Conditions were then satisfactory. But observing the increased rate of make attendant upon the increase in the proportion of down-steam, it was thought worth while to see how far this could be carried, and what the consequent results would be. Therefore, the proportion of down-steam was progressively increased, increasing at the same time the total amounts of both up-and-down steams, maintaining also favourable cleaning conditions. It was found that the rate of make increased proportionately to the increase in total steam, which latter was made possible by the change made in the ratio from 60 up : 40 down to 40 up : 60 down. The down-steam had been increased 50 p.ct.; the up-steam diminished in the same proportion; and the total amount increased 40 p.ct. Comparing the figures at the start of the experiment with those at the end, we have:

Increase in make per set from . .	2001 to 2800
Decrease in fuel per 1000 c.ft. from .	38·0 to 33·0
Increase in B.Th.U. per gallon from .	103,000 to 107,500
Decrease in oil per 1000 c.ft. from .	3·25 to 2·80

Bringing both sets of figures to a basis of 2·80 gallons per 1000 for comparison, we have:

	P.Ct.
Increase in make per set	45·0
Decrease in fuel per 1000 c.ft.	16·2
Increase in oil efficiency	4·3

These figures are subject to some discount, because, with the better grade of fuel in use, better figures might have been obtained under the old method but for the fact that under this method clinker troubles were unavoidable.

Later, our fuel changed to structurally the same as before, while retaining the higher ash fusion point; and the system was modified by using a higher blast pressure to even further increase the rate of make. The figures for the month of February, 1919, may be taken as representative of the best under the old method of running, and those of May, 1919, under the new. They are:

	February.	May.
Make per set	2042 ..	3086
Fuel per 1000 c.ft.. . .	38·2 ..	34·1
Oil per 1000 c.ft. . . .	3·30 ..	2·86
B.Th.U. per gallon . .	102,751 ..	107,575
Ratio of up steam to down steam	60 U : 40 D ..	40 U : 60 D
Blast pressure, inches .	36 ..	45

Allowing for increase in blast pressure and decrease in oil per 1000, we have:

	P.Ct.
Increase in make per set	35·0
Decrease in fuel per 1000 c.ft.	13·9
Increase in oil efficiency	4·7

Owing to the extra amount of clinker to be removed, an additional cleaning period was required; and the latter fuel figures should really be credited with the wastage of fuel entailed in so doing. The fuel bed under the new operation was of the same depth as before; but the temperature, instead of being more or less uniform throughout, graduated from unignited coke at the top to highest incandescence at the clinker zone. This clinker was cool enough at the grates to break-up easily; and the grates were in no case warped.

Theoretically, from the point of generator operation alone, the most efficient fire would be one in which down steam only was used—that is to say, a fuel bed through which the air and steam were passed in opposite directions. Under these conditions the fuel bed would graduate from black, unignited coke at the top to incandescent fuel and molten slag at the bottom. In such a case the blast, entering at the bottom of the fuel column and meeting as it does the hottest fuel, is transformed in a relatively thin zone into CO_2, thereby generating most of the heat in this lowest part. Passing thence upward through various zones of diminishing temperatures, its sensible heat is largely given up to successive cooler ascending zones, ending with the freshly-charged fuel at the top, and in its passage very little of it is reduced to CO. Therefore, the blast will carry off comparatively little heat from the generator, either as sensible heat or as CO.

The steam, on the other hand, entering at the top will come in contact first with the coolest part of the fuel bed, which part, however, will be higher in temperature than it, and will pass downward through successive zones of increasing temperatures, which will first superheat, and then decompose with increasing intensity according to the equation:

$$2\,H_2O + C = 2\,H_2 + CO_2$$

and, finally, on reaching the hottest zone, to:

$$2\,H_2 + CO_2 + C = 2\,H_2 + 2\,CO$$

and exit at the hottest part of the fire carrying a maximum of sensible heat. That is to say, under these conditions the greatest possible amount of heat generated by the blast would be stored in the fuel for use in decomposing the steam, and the waste heat in the blast would be consequently at a minimum.

This extreme condition can never be realized in practice for mechanical reasons, if for nothing else, with the present setting, because of the effects of the high temperature upon grates, cleaning doors, &c. Also under these conditions we have a continuous graduation from one extreme of temperature to the other; while it seems in practice better to deepen the lower final gas-making zone by the use of some up steam. That is to say, while it is desirable to have the steam preheated, superheated, and partially

decomposed on its downward course, it is also essential to have the final gas-making zone of sufficient depth to insure full final contact of the steam with the fuel at the proper temperature. Further, as the gas-making period occupies an appreciable time and is not instantaneous, it is necessary in practice to have the lowest zone sufficiently hot at the top or the beginning of the run, to result in an even temperature throughout at the end of it. Both these conditions must be satisfied to prevent an excess of undecomposed steam passing through. The maintenance of these conditions is facilitated by high air velocity—that is, a short blow and a high blast.

As regards carburation, in theory insufficiency of heat in the blast might be made up for by increased sensible heat in the blue gas. As we have not been able to attain these extreme conditions, this is open to question. As a matter of fact, in actual operation with the increased down-steam ratio there seems to have been just sufficient heat available, and changes in operation have not been limited by this factor.

This practical modification of the theoretical method should have the following advantages: It should be most economical of fuel, as more of the heat generated by the blast will remain in the fuel to be utilized by the steam, and only the amount necessary for carburation will be carried over into the rest of the set. Capacity will be increased, because more of the heat generated is available for steam decomposition. By reason of the comparatively low exit temperature of the blast, and because it is lean in CO, it will be of less volume, thereby diminishing back-pressure at the generator outlet, and, for the same entering blast pressure, increasing the flow of air through the fuel bed. Because of the leanness of the producer gas, less secondary air will be required for complete combustion, and, consequently, more blast air will be available for the generator. This increase in generator air results in an increased rate of make. The advantages claimed for the above system have been realized in our practice, as shown by the figures, as we have experienced increase in rate of make, decrease in fuel consumption, and greater efficiency from our oil.

Cleaning fires has been no more difficult than previously, and the total time so spent is no longer than before, in spite of the extra period required. Flues and generator tops show a much longer life, as do hot valves also, on account of lower temperature. Because of the concentration of heat in the bottom only, the lower one-third of the generator lining has to be renewed, as against a half to two-thirds previously. In general, cost of repairs has not increased in the same ratio as the capacity of the set. That is, a decrease in repair cost per thousand is shown.

In general, this method has proved very satisfactory with us in increasing both production and efficiency through diminution of waste heat in the set itself. While the results have been gratifying, we feel that the operation is still in an experimental stage, and that a further application of the theory is possible with attendant increased efficiencies, when conditions become more uniform and our auxiliary apparatus has been brought up to the standard required.

Darlington Gas Profits.—At Darlington this year the trading concerns are contributing £8000 for the relief of rates, as compared with £4000 last year. The Gas Department hand over £2500; whereas last year nothing was given. In 1914, the Gas Department contributed £7000; and during the 1915 20 period the figure was £15,000.

National Health Week.—The first week in May has been reserved for the celebration of National Health Week; and already there are indications that the movement will rapidly recover the ground lost through the necessary interruption due to the war. No fewer than 300 local authorities throughout the country are in correspondence with those responsible for organizing Health Week. No set programme is prescribed; and the different localities are encouraged to make use of the occasion to develop on their own lines measures for awakening the public conscience and informing the public mind. The central organization is in the hands of a Committee, among the members of which is Mrs. M. A. Cloudesley Brereton. Suggestions made for programmes in different centres include gas and electrical exhibitions in connection with cookery and smoke abatement. The object is to focus public attention for one week in the year on matters of health.

No Dividend Possible at Ferndale.—Presenting the accounts at the annual meeting last Friday of the Ferndale Gas Company, Ltd., the Directors reported that the net revenue for the year ended Dec. 31 was insufficient to meet the debenture interest; and consequently they regretted that both preference and ordinary shareholders were again called upon to forego a dividend; it is, however, hoped that the increases made in the price of gas, &c., and an expected increase in sales during the current year, will once more make the undertaking a dividend-paying concern. There was a further reduction in the sale of gas to private consumers during the year; but as against this there were 282 public lamps lit during the last quarter, compared with 165 at the end of 1918—thus considerably increasing the sales of gas for public lighting, and bringing the number of lamps lit at the end of the year to within 36 of the number lit at the end of 1914. The Directors have found it necessary to further raise the price of gas from 6s. to 7s. per 1000 c.ft. as from Jan. 1 last, and also to raise the hire of meters, cookers, &c., by 50 p.ct. In the past year the Directors have undertaken the renewal of the manufacturing plant; and this has entailed considerable expense, which has been guaranteed by them. A portion of this plant, consisting of two beds of six retorts, in connection with which a steaming process has been adopted, was brought into action during last quarter; and the Company have since been able to give the consumers a satisfactory supply. The Directors believe that, when the work now in hand has been completed, they will be in a position to fully meet the requirements of the district for some time to come.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Three Times the Gas for the Same Money.

Sir,—The attention that you are good enough to give to criticism of my proposals from time to time, is very flattering, and places me under great obligations. In the latest contribution by "Engineer," so many questions and issues are mixed up that it would, I fear, occupy too much of your space were I to answer it. I should like to reply to all criticisms however presented; but do you seriously think that a contributor to your columns who hides his indentity in such a matter has a right to an answer? I demonstrated in London on eight separate occasions, and was prepared then and there to face and answer any critic. Discussion was invited. I have to fight in the open; and my critics have the same privilege. Then, again, Sir, you shower honours so thickly upon me that I am embarrassed. Last week you presented me with a Coat of Arms for my family. In this issue, you are gracious enough to refer to the "Nuneaton enthusiast," and to "that gentleman's statements having the shells stripped off, showing a kernel not so fat, &c."—or words to that effect. As you may know, I have many whims; and I should like to ask you to be just a little indulgent to some of them on this occasion. For instance, I fancy that while it may be quite good cricket to make remarks of the kind I refer to after criticism has been answered, it is scarcely as good a game played the other way about. I may be wrong. But in any case I am prepared to make a bargain with you; and on condition that you temporarily hold these remarks over, or consider them as held over, I will answer as fully as I can any single simple question that you like to put to me, on "Engineer's" criticism, or any other like question in place of it that you may prefer, provided it is technical and not personal or humorous.

Just to be going on with, I may say that "Engineer" (whoever he is) does not show in his criticism a knowledge of the principles concerned in the cost and selling price of gas. There is not a single point he raises that presents any difficulty, or necessitates the least modification of my statements. I will meet him in public, if he so desires, on all the issues he raises, or would like to raise.

I am prepared to supply gas at the price I stated at my demonstrations to any individual consumer who requires the equivalent of 20,000,000 c.ft. of 450 B.Th.U. gas a year. I am also, I think, prepared to supply gas at the same price to any section of a London or other gas company's main system where the necessary facilities for putting-in the plant are at hand. There should be no difficulty in finding a section of a mile or two where gas is being used at the rate of 20,000,000 c ft. or 50,000,000 c.ft. a year on the basis above referred to, which could be isolated and my gas supplied through the existing mains, services, and meters of the customers concerned. I say I think this could be done, because I have scarcely had time to weigh all the pros and cons. But I will certainly most seriously consider a proposal if you know of any gas undertaking sufficiently interested in its business to help me in the matter. It would then be fairly safe to assume that what can be done with a section can be done with the whole. Large undertakings say they cannot make the experiment because it would interfere with their whole system, &c. Here is a suggestion for them.

Further, if you can give particulars of any test whereby 60,000 c.ft. of 400 B.Th.U. gas with 3 p.ct. inerts have actually been obtained from one ton of ordinary coal, it would help forward progress very much indeed.

Finally, I state emphatically that no opposition of any individual or section of individuals, or even the Government itself, will prevent gas consumers from having at least three times the heat energy they are now receiving for the same money. They are entitled to it, and they will have it; and you, I am sure, would really like to help them to that end.

George Helps.

Nuneaton, April 9, 1920.

Stewart's Thermal Balance of Coal Distillation.

Sir,—In his paper before the London and Southern District Junior Gas Association, which appeared in the "Journal" for March 30, Mr. E. G. Stewart gave a thermal balance of coal distillation showing a loss of 0·9 million B.Th.U. per ton of coal carbonized. This is quite in accord with many published results; and the generally accepted interpretation is that the carbonization process is exothermic—the loss being due to the evolution of heat within the retort. In a further consideration of the distribution of heat given to the retort, the author stated that 0·9 million B.Th.U. are absorbed in the carbonization of coal—a result which is incompatible with the thermal-balance as previously given.

On the basis of the author's figures, the correct distribution of the heat in the coke used for fuel would appear to be:

Sensible heat in hot gases	0·69	million	B.Th.U.
,, ,, ,, coke	0·99	,,	,,
Total sensible heat in products	1·68	,,	,,
Heat evolved during carbonization	0·90	,,	,,
Heat transmitted to the retort	0·78	,,	,,
Heat lost in ashes, radiation, and convection	1·02	,,	,,
Sensible heat of flue gases	1·20	,,	,,
Heat unaccounted for	1·80	,,	,,
Total heat in coke used for fuel	4·80	,,	,,

The heat unaccounted-for is equivalent to 1·4 cwt. of coke fuel per ton of coal carbonized—a quantity which is worthy of further consideration. Furthermore, in the author's paper the efficiency of heat transmission to the retort is given as 50 p.ct.; on the above basis, it is only 16 p ct.

H. Hollings.

April 6, 1920.

Price's Lecture Experiment.

In last week's "JOURNAL" there was reproduced from the "Chemical News" an article describing a lecture-room experiment on the combustion of coal gas. In our contemporary's issue for the 9th inst. was a letter, dealing with the matter, from Mr. William Payman, M.Sc. (Tech.), of the Home Office Experimental Station at Eskmeals, Cumberland.

Mr. Payman wrote: The "phenomenon" described by Mr. Price is not "of the nature of a gas-cap"—the flame observed being that of ordinary combustion of coal gas burning in an excess of air. Neither in this instance, nor in the case of a gas-cap formed above an oil-flame, is the gas "burning below its actual ignition-point." The true explanation of the formation of the flame is the one given by Mr. Price in his last paragraph: "The presence of the wire lowers the velocity of the mixed gases, and so allows the gas to burn; but the combustion cannot be transmitted to the uprising gas, as its velocity is greater than the rate of propagation of burning." An explanation of the mode of formation of a true gas-cap and of the flame described by Mr. Price will make their difference clear.

When an oil-flame is introduced into an inflammable gas mixture, the latter ignites, and a flame passes through the mixture, continuing to burn until all the mixture has inflamed, even if the oil-flame be removed. The heat produced by the burning gases is of itself sufficient to raise the adjacent unburnt gas to the ignition temperature. If the percentage of combustible gas be below the lower limit of inflammability, flame will not propagate, since a burning layer of gas will not produce the required amount of heat to raise to the ignition temperature the temperature of the contiguous layer of unburnt gas. Extra heat may be supplied by an external source—such as an oil flame; and the gas immediately surrounding the flame may then be kept at its ignition temperature with the help of this extra heat. A gas-cap is then formed. It will be seen that the gas-cap can only form round the oil-flame, and can only persist while the latter is kept in the mixture. The increase in height of the cap with (1) a higher testing flame and (2) a higher percentage of inflammable gas is explained in this way—being due to the extra heat provided, with the heating-up of a larger quantity of gas to the ignition temperature.

The fact that the flame described by Mr. Price persisted without the assistance of external heat, at once distinguishes it from the gas-cap. The experiment described is similar to the well-known experiment illustrating the principle of the Davy safety-lamp. If a piece of wire gauze be placed above the mouth of a bunsen burner, the gas stream may be ignited above the gauze, but will not strike-back through the gauze. In the present experiment the wire acts as a "gauze" of a single strand.

The usual appearance of the bunsen flame is due to the fact that the gas mixture issuing from the burner tube contains insufficient oxygen for the complete combustion of the coal gas. All the available oxygen is burnt-up at the inner cone of the bunsen flame; and the excess of coal gas is burnt as it comes into contact with the oxygen of the outer air. In the experiment described, the gas issuing from the burner-tube mixes with the required external air for complete combustion before it reaches the gauze or wire; and so above this we get the ordinary pale blue flame of ordinary combustion of coal gas as burning in excess of air.

It is to be hoped that Mr. Price will not continue to use this experiment to illustrate gas-caps to his students, as it will be seen that it is entirely misleading.

REGISTER OF PATENTS.

Retort Ovens.—No. 125,980.

HAUSER, E., of Madrid.

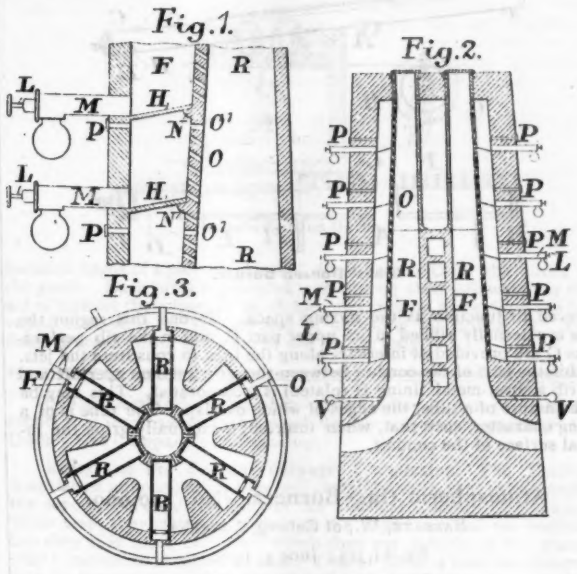
No. 9970; April 22, 1919. Convention date, April 20, 1918.

This invention relates to improvements in retort ovens of the type described in a patent of Hawkins and Barton (No. 5464, of 1890), wherein vertical retorts having closely spaced openings on one or more sides for the escape of the gases are employed, and wherein the gases distilled pass outwardly from the retort, instead of inwardly to a central duct, and also to retorts which, instead of being vertical, are steeply inclined and completely filled—leaving no inner passage for the free egress of gas.

In many retort ovens it has been proposed to effect the separation and fractioning of the products of distillation by subdividing the collecting flue into compartments by partitions or sliding dampers—each compartment having an off-take controlled by a cock, whereby the products may be withdrawn from several different zones of the retorts; but in none of these arrangements have the retorts been formed with closely-spaced openings, as in the Hawkins and Barton type of retort.

The present invention applies "in an improved manner" this system of withdrawing the products from several zones of the retorts to retorts of the Hawkins and Barton type, by means of fixed transverse partitions which slope downwards outwardly in the collecting flues—thus preventing the leakage which may take place past sliding dampers, and also preventing easily condensed products from falling back into the retorts.

Fig. 1 is a vertical section of a portion of a retort-oven of the Hawkins and Barton type embodying the invention. R is the retort and O the closely-spaced channels or apertures in one wall which incline downwardly from the exterior to the interior of the retort, and through which apertures the gases pass from the retort into the collecting flue F. The apertures may be substantially horizontal orifices O^1, which serve as sight apertures for watching the process of distilling through registers P, and through which a rod may be introduced to facilitate the descent of the charge and prevent choking or stoppage, or through which a pyrometer may be passed. The existence of the apertures permits the orifices at the top of the retort to be used exclusively for charging, though in some cases (as where the fuel being distilled gives off a large amount of steam at low temperature) it may be convenient to let part of the steam escape by the top orifice, which may then be constructed in the usual manner with two openings—one for charging and the other for the egress of the steam. The collecting flue F is divided into zones by fixed transverse partitions H, which slope downwardly away from the retort and rest on ribs N formed thereon. Each compartment or zone of the flue has an off-take pipe M controlled by a cock or valve L, whereby the escape of the gases of distillation from that zone may be regulated.



Hauser's Retort-Ovens.

Where the oven has a plurality of retorts R, as shown in fig. 2 (which is a vertical section of a Scotch oven of the Hawkins and Barton type and having two vertical retorts) and also in fig. 3 (which is a horizontal section of an oven with radially disposed retorts), the off-takes of corresponding zones may be connected by a manifold B. V (fig. 2) indicates piping for receiving the steam.

It is assumed in the illustrations that the gases of combustion proceed from a grate or gas generator altogether independent of the body of the retort.

In these improved, as in the other known retorts, air, inert or reductive gases, or aqueous vapour, may be injected if desired at the lower part, or at any convenient height. This may be effected by connecting the valve controlled off-take pipes M of any desired zone or zones with a reservoir or producer containing, or giving off, the inert gas or the like at a pressure a little higher than that of the interior of the retort. Thus the gas will enter the retort from this zone or zones and escape by the off-takes of other zones.

Heating Walls of Coke-Ovens and the Like.

No. 135,091.

ROBERTS, A., of Chicago, Ill., U.S.A.

No. 5748; March 7, 1919.

One of the objects of the present invention is to provide a form of heating wall for coke-ovens and like chambers whereby the desired proportion of heat will naturally travel towards the interior of the carbonizing chamber, leaving only a desired proportion for the heating of the recuperating structure. In this connection, a further object is to provide a construction whereby this result may be attained in a heating-wall built-up from blocks having their vertical and horizontal faces recessed so as to provide a mesh-work of interconnected gas-passages.

According to one feature of the invention the heating wall comprises blocks, some of which are recessed to provide a number of passages within the body of the wall; the arrangement being such that a greater amount of heat is delivered from the gases into one face of the wall than into the opposite face. A further feature consists in a block having its end portions formed for engagement with other blocks, wherein the central portion of the block is of reduced cross section and of suitable formation to provide increased heat-abstracting ability at one end of the block.

Bunsen Burners.—No. 139,862.

GIBBS, A., of Birmingham.

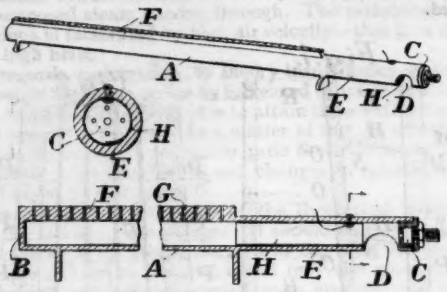
No. 3208; Feb. 10, 1919.

This invention is particularly applicable to burners having an elongated row of jets which emanate from an elongated conduit or chamber, in one extremity of which a gas admission jet is provided, with air admission openings near it. The object is to minimize the friction to the mixture in its passage through the mixing area between the gas admission jet and the row of jets in the conduit or chamber, "thereby enabling the mixing to take place with the least possible impediment to the flow of gas and air, and ensure an even supply of mixture to the several jets."

The mixing chamber is provided with a sleeve or lining having a plated, polished, or otherwise brightened surface. It is furnished with

an internal tube or lining of a spring character, and having a brightened surface and being adapted to have expanding gripping action upon the internal surface of the mixing chamber.

As shown, the burner comprises a tube or conduit A closed at one extremity B and having at its other extremity a jet plug C, which may contain a number of perforations adapted to admit gas. At a short distance beyond the plug the conduit is formed at its under side with the air admission aperture D, and beyond this a length of tube E is



Gibbs' Bunsen Burner.

reserved to function as the mixing space. Beyond this region the tube is externally ribbed at its upper part F, and in the rib perforations G are provided at intervals along the tube to constitute the jets. Within the part of the conduit between the air admission aperture and the rib a sheet-metal lining H (plated) is incorporated. This may be in the nature of a tube, the edges of which overlap. The tube is of a spring character, such that, when inserted, it externally grips the internal surface of the conduit.

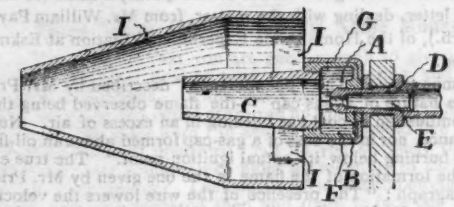
Atmospheric Gas-Burners.—No. 139,969.

Barratt, W., of Coburg, Australia.

No. 14,345; June 5, 1919.

This invention is directed more particularly to atmospheric gas-burners employed to heat small furnaces, bath heaters, and the like. It comprises a mixing chamber wherein is an axially disposed gas jet connected to a supply pipe and having a number of holes in the periphery of the chamber for the admission of air; the forward end of the mixing chamber in line with the gas-jet being provided with a nozzle projecting into a larger nozzle having separate air inlets. Means are provided for regulating the admission of air to the burner to enable a properly proportioned mixture to be effected from a given pressure of gas.

The burner (as shown) comprises a mixing chamber A of cylindrical formation having a hole B centrally in one end, while the other end is provided with a tapered nozzle C, screwed into a threaded opening in



Barratt's Atmospheric Gas-Burner.

the mixing chamber. A gas-jet D, screwed into the hole B in the outer end of the mixing chamber, preferably is formed with a tapered bore E, and is connected to a gas supply pipe [not shown] and provided with a cock for regulating the quantity of gas passing through it.

A number of air admission holes F are formed in the cylindrical periphery of the mixing chamber, and a sleeve valve G, furnished with holes H, is fitted rotatably over the chamber. The holes in the walls of the mixing chamber and those in the valve correspond in size and shape, and are so arranged that the valve can be adjusted to regulate the admission of air to the mixing chamber. A nozzle I is fitted concentrically around the nozzle C; the annular space between the two nozzles being sufficiently large to permit of a free draught of air.

When the mixture is ignited at the end of the outer nozzle, the heat of the flame induces a pull on the air at the outer end, thereby causing air to be drawn into the nozzle in correct quantities to produce a properly proportioned mixture of gas and air to effect complete combustion and the generation of a maximum amount of heat.

Isolation of Carbazole.—No. 139,981.

Burt, Boulton, and Haywood, Ltd., and Miles, F. D., of Silvertown, E.

No. 15,440; June 19, 1919.

One method of isolating carbazole from mixtures containing it—such as tar distillates or the residue remaining after the removal of anthracene or other hydrocarbons from such distillates—consists, the patentees point out, in heating the mixture with caustic potash, whereby the carbazole becomes potassium carbazole, which is subsequently decomposed by water. The process is "expensive and wasteful," since the proportion of potash required is large and much of it becomes

THE
Wilson "Premier" Low Pressure Steamer

THIS APPARATUS IS SPECIALLY CONSTRUCTED FOR STEAMING VEGETABLES, PUDDINGS, FISH, &c.

IT IS FITTED WITH FIVE GALVANIZED WIRE TRAYS.

THE STEAM IS RAISED BY AN ATMOSPHERIC GAS BURNER UNDER THE WATER TROUGH.

NO STEAM VALVES OR TRAPS REQUIRED.

IF FITTED WITH BALL TAP CISTERN, WATER LEVEL IS AUTOMATICALLY MAINTAINED.

FOR FURTHER PARTICULARS SEE OUR LIST OF CANTEEN APPARATUS.

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carbonate during the reaction. Moreover, the temperature required is high, producing decomposition products, which, together with substances originally accompanying the carbazole, are imperfectly removed from the product.

By the present invention, carbazole can be isolated as a metal compound, decomposable by water for obtaining carbazole, by heating it (or a mixture containing it) with an alkali metal, or an oxide or hydroxide of an alkali metal in presence of an indifferent solvent, at a temperature below the melting point of the alkali carbazole. Naphthalene is a suitable solvent, and can be used at normal pressure; and solvents of lower boiling point than naphthalene may be used under pressure—such as toluene, for example. The mixture is preferably well stirred during the heating. The metal compound of carbazole separates in the form of a solid precipitate from the liquid solvent.

In one suitable method of carrying out the invention, 85 lbs. of potash containing 80 p.ct. of potassium hydrate and 20 p.ct. of water are melted, and 180 lbs. of naphthalene and 180 lbs. of impure carbazole are added. The mixture is heated and stirred until the naphthalene has dissolved all the carbazole. The heating is continued so that the potash reacts with the carbazole, and water and naphthalene are distilled over. The naphthalene is condensed—some 120 lbs. being thereby recovered at this stage. Then 360 lbs. of heavy coal-tar naphtha, distilling about 90 p.ct. at 190° C., are run into the apparatus, and the mixture is raised to the boiling point and passed into a filter in order to separate the solid potassium carbazole from the liquid; the bulk of the impurities remaining in the latter.

The solid potassium carbazole is then boiled with water until completely decomposed; the adherent naphtha and naphthalene being also removed. The carbazole is then filtered, and washed free from potash. It may be further purified by crystallization or distillation. The potash may be recovered in any suitable manner.

By the use of the neutral solvent as described, the temperature is sufficiently low to avoid decomposition of the metal-carbazole, which is precipitated in an unfused state and is protected from atmospheric oxidation by the vapour of the solvent.

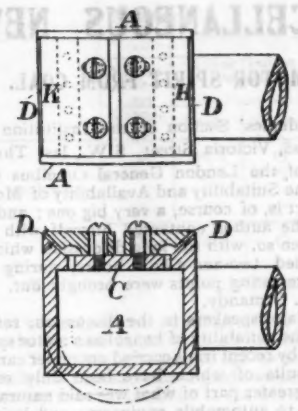
Bunsen Burners.—No. 140,017.

Helps, George, of Nuneaton.

No. 24,041; Feb. 19, 1919.

This invention relates to a modification of that described in patent No. 133,107—"a burner composed of a trough and a cover, the outlet orifice being formed by the edges of the cover and a projecting edge of the trough." The patentee now finds that this form is applicable to small burners in which the chamber cannot be termed a trough and may conveniently be square or nearly so.

The illustration shows a section and plan of a square burner in which the body A is closed with a head C provided with orifices. On two sides there are bevelled extensions A^1, which, together with the bevelled edges of a pair of plates K, form orifices D for the outlet of the gases. Each plate is provided with oblong slots allowing (by the aid of screws) the plates to be slidden towards or away from the bevelled extensions for the purpose of adjusting the orifices D. The flame proceeds from two sides of the burner only.



Helps's Bunsen Burner.

Dudley Gas-Works Ownership.—The Dudley Lighting Committee report that they cannot recommend the Corporation to purchase the Dudley Gas Company's undertaking.

Report of the Decimal Coinage Commission.—The Decimal Association announce that they will certainly not accept as conclusive the report of a small majority of the Decimal Coinage Commission. What steps they may take in view of the report are not yet decided; but they offer some criticisms which they say indicate a few reasons why it cannot be accepted as final. One of these is that the Commission by the report, "ignore the altered and daily decreasing purchasing power of the penny, and exaggerate the difficulties attending its abolition, while giving insufficient attention to the many advantages of having 100 logical steps between the mill and the florin as against the irregular and profiteer-encouraging transition of 96 illogical steps between the farthing and the florin. Yet the majority report, so far as it condemns the principle of decimal currency, is only signed by eleven members, as against nine in favour."

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The "Main" Circulating Water Heater.

THIS Gas Heater is constructed throughout of strong cast iron with corrugated inner and outer jackets giving an unprecedented heating surface. The gases, after heating the inner jacket, are drawn to the base, and to reach the flue outlet must travel over the outer casing, thus utilising the heat to the utmost.

A really efficient thermostat is fitted; and the heat-retaining outside casing is made of steel, porcelain enamelled, giving the heater a most attractive appearance.

A sample will convince you of its efficiency.

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WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

MISCELLANEOUS NEWS.

MOTOR SPIRIT FROM COAL.

Before the Graduates' Section of the Institution of Automobile Engineers, at No. 28, Victoria Street, S.W., last Thursday evening, Mr. W. D. Pile, of the London General Omnibus Company, read some "Notes on the Suitability and Availability of Motor Spirit from Coal." The subject is, of course, a very big one; and the notes were so extensive that the author contented himself with reading a summary of them. Even so, with the long discussion which followed, the proceedings occupied two-and-a-half hours, during which time a great number of interesting points were brought out. The chair was taken by Dr. W. R. Ormandy.

The author, and later speakers in the discussion, referred to many matters regarding the suitability of benzol as a motor spirit which have been demonstrated by recent trials carried out under carefully arranged conditions, the results of which have been duly recorded in the "Journal." The greater part of what was said naturally was of more immediate concern to automobile engineers; and it is only possible here to touch upon one or two aspects of the important questions that were dealt with. It is, Mr. Pile remarked, generally accepted that a substitute for petrol as a motor fuel is very desirable. The recrudescence of the campaign in favour of benzol, originating from the increasing price of petrol, has given rise to three classes of opinion among motorists: (1) The frankly antagonistic; (2) those who hold that the fuel is injurious to the engine; and (3) those who are open to conviction. A review of the evidence of suitability of this fuel had therefore been made, to attempt to show that: (1) Antagonism is unjustifiable; (2) the injurious effects attributed to benzol are the outcome of a lack of standardization; and (3) lack of conviction may be chiefly due to lack of information.

The injurious effects attributed to the use of benzol may often be accounted for when it is remembered that confusion still exists between benzol, benzene, benzine, and benzoline. Fuels supplied under the designation "benzol" may, in reality, consist of badly-refined mixtures of benzine and homologues of benzene, rich in sulphur-containing impurities. The varying quality of composition of fuels supplied as benzol has given rise to continual difficulties and disappointment, and prejudiced many users against home-produced fuels. The adoption of a standard will protect the consumer against imposition and resultant injury to his engine. Until recently, no such standard had been laid down; but fuel complying with this standard is now obtainable, and its use practically precludes the possibility of injurious effects.

Now, 90 p.ct. benzol has an average pure hydrocarbon content of 95 p.ct. Under normal conditions, it is chemically impossible for benzene and toluene to have an action on metals. There remains 5 p.ct. of the fuel made up of varying amounts of hydrocarbons of the paraffin and naphthene series. In addition, small quantities of carbon bisulphide, mercaptans, and thiophene are present. These sulphur-containing compounds vary in quantity with the efficiency of the washing and distillation. The sulphur content should not exceed 0·4 p.ct. to avoid foul-smelling exhaust and possibility of valve corrosion. It may therefore be concluded that the action of these impurities on the tank will be so small as to be negligible. What has been remarked as applying to tank materials may be taken to hold good with reference to the materials composing the supply-pipes, filter, and carburettor. Paintwork and enamel, also varnished cork-floats, will be affected by this fuel, as benzol is largely used in making-up paint and varnish.

It is advisable to insert a layer of cotton-wool between two layers of mesh in the filter-funnel, when filling a tank with benzol. Lead or glass wool may be introduced into the fuel system filter, to increase its efficiency. The inefficient combustion of benzol will give rise to a large amount of unburnt carbon. This carbon is of a fine fluffy nature, which, though easily blown-out in the exhaust, will badly carbonize plugs. The ejection of carbon in the exhaust reduces carbon deposit in the cylinder. The rate of thermal transfer, due to deposits, is thus only slightly affected, and the chances of "knocking," due to excessive heat, are minimized. It is desirable to use a straight-run mineral oil as an engine lubricant with benzol. The formation of a sludge, reputed to be sulphonated fatty oil, in the crank-case, when using compound oils, is attributed to the presence of sulphur impurities in the unvaporized benzol which is forced past the rings. Where compound oils are employed, it is advisable to change the portion in use about twice as often as when the engine is run on petrol.

The recent agitation in the Press advocating the scientific treatment of half this country's coal consumption annually to obtain motor spirit, is open to criticism on two grounds: (1) The production of coal suitable for coking is not sufficient to warrant the treatment of half the total coal produced; and (2) the quantity of coal coked is dependent on the demand for the main products resulting. This demand, under present conditions, is insufficient to justify the coking of more than one-fifth of our annual consumption. A demand for the main product of a second process would justify the coking of a second fifth; but no such demand at present exists. The conclusion arrived at, therefore, is that it is possible to produce a very large proportion of our motor fuel by coking one-third of our annual consumption of coal, but that such a development is unlikely to occur with sufficient rapidity for the supply of the resultant motor fuel to overtake the rapidly-increasing demand.

According to official returns, the quantity of motor spirit imported into this country during the year 1919 was 200,332,648 gallons; and it is estimated that this year it will reach 250,000,000 gallons. The development of home produced fuel appears to lie a long two possible lines: (1) The scientific and economical use of coal; and (2) the cultivation of alcohol-producing vegetables. Of these, the second, though potentially the most plentiful source of motor fuel, appears more suit-

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No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

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ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

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able in its essential conditions to Colonial enterprise. The economical use of coal is eminently desirable; and, of any fresh scheme designed towards this end, the production of motor spirit may form an increasingly important part. There can be no justification whatever for the lamentable fact that about 80 p.ct. of our raw coal is practically wasted annually.

According to a report by the Fuel Research Board on Gas Standards, the gas industry uses from 18 to 20 million tons of coal annually. It is estimated that from the resulting gas about 30 million gallons of benzol could be extracted annually by scrubbing. In the Coal Conservation Committee's report of 1918, it was stated that over 20 million tons of coal were being carbonized in coke-works. In 1918, the quantity coked in bye-product plants was estimated at 14·6 million tons, from which approximately 32·16 million gallons of benzol were produced. The total possible production of benzol from these two sources, including the amount recoverable from tar, is suggested as being in the region of 76½ million gallons. In this estimate, it has been assumed that all available benzol has been extracted; but this is not carried out.. In 1917, and up to the armistice, slightly over 42 million gallons per annum were produced; and it is estimated that the production to-day does not exceed 25 million gallons.

There are, however, two other factors in the economical use of coal: (1) Alcohol from coke-oven and gas-works gas; and (2) motor spirit produced by low-temperature carbonization. Messrs. E. Bury and O. Ollander * have shown how it is possible to recover ethylene from coke-oven gases, and fix it as alcohol. The estimated yield of alcohol from 38 million tons of coal by this process is 62·8 million gallons. The value of this additional alcohol is not fully appreciated, unless it is understood that a half-and-half mixture of alcohol and benzol can be used in almost exactly the same way, and with almost equally good results, as petrol.

The production of a domestic fuel which mitigates waste of volatile products has been a subject of investigation for the past ten years; and by the low-temperature carbonization of coal a fuel is produced which is claimed to be suitable in all respects for domestic use. Among the bye-products recovered in this process are 3 gallons of motor spirit per ton of coal treated. The coal consumption in 1913 for domestic heating has been given as 35 million tons; and if the coal thus consumed had been replaced by the fuel resulting from low-temperature carbonization, in addition to the other bye-products, a quantity of motor spirit amounting to 150 million gallons would have been produced.

Thus it is conceivable that, by treating a little over one-third of our annual coal consumption, 259 million gallons of motor spirit might be available. Our production to-day is about one-tenth of this quantity. Signs of activity in coal conservation are apparent; results are virtually absent; prospects are very limited. The necessities of the situation are pressing, as the whole future of the motor industry is bound-up in the single question of fuel supplies. Mr. Pile would have liked to be able to say that not only is benzol suitable, but that sufficient may become available in the near future to make this country independent of other sources. The facts, however, so far as he has been able to ascertain them, indicate that such an attitude would be untenable. It is therefore necessary to turn attention to the development of the use of alcohol—a motor fuel the supply of which is dependent, not on the diminishing products of past ages, but on the generous annual reproduction of Nature.

* See "JOURNAL," Vol. CXLVIII., p. 718.

SUMMARY.

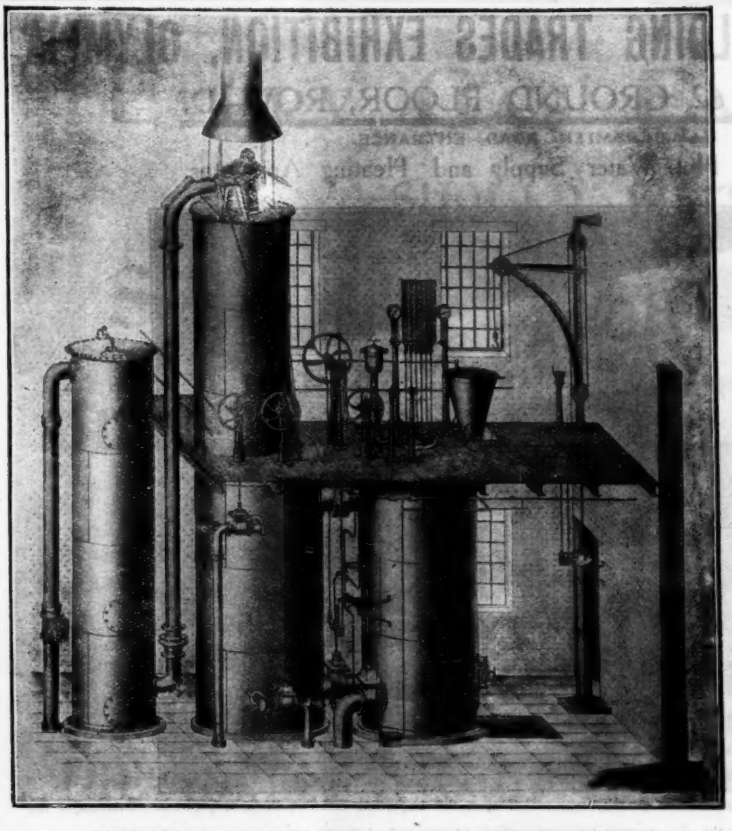
—	Million Tons Coal Coked.	Million Gallons Benzol.		Million Gallons Alcohol.	Million Gallons Motor Spirit.
		Crude.	Refined.		
Gas-works	18	30 6	19	30·8	—
Coke-works	20	43·6	27	32·0	—
Low-temperature carbonization	50	—	—	—	150
	88	73·6	46	62·8	150

Total. . . . . 258·8 million gallons.

Among those who took part in the discussion,

Mr. P. G. SOMERVILLE pointed out that the National Benzol Association had set-up a standard specification for benzol which had been accepted throughout the country; and it was of the utmost importance that everyone, in procuring benzol, should take care to obtain "National" benzol. There was other benzol on the market which did not conform to the National Benzol Association specification. In answer to a question, he said his Association represented nearer 80 p.ct. than 70 p.ct. of the output of benzol.

The CHAIRMAN remarked that he believed the sulphur-content of the benzol had no deleterious effect whatever on the engine. There was no justification for any coke being manufactured for metallurgical purposes without the benzol being collected. If gas-works took the benzol out of their gas, it was necessary to employ carburetted water gas; and they had to pay so much for the oil that it cost as much as they would gain by selling the benzol. Its extraction therefore simply added to the gas manager's worry. So long as this was the case, he did not think there was any prospect of gas companies generally taking out the benzol; and he did not see any chance of a reduction in the price of oil. He himself had been preaching alcohol for twenty years past; but for this they would have to depend upon the Colonies. The alcohol might be produced there; but who was going to do it? Large sums of money would have to be found, and much pioneer work done. Both alcohol and ether and alcohol and benzol worked perfectly.



DEMPSTER'S PLANT FOR LIGHTLY CARBURETTED WATER GAS.

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Captain Montgomery, of the Automobile Association, also spoke of his satisfactory experiences with benzol.

Mr. Pile said he wished Mr. Somerville's Association success, because much of the information in the paper could not possibly have been obtained without his assistance.

SOUTHPORT GAS ESTATE AND THE RATES.

The new borough rates for Southport show an increase of 2s. 8d. in the pound; the total borough rate being 10s. To this will have to be added the poor rate, which has not yet been levied; but an increase is anticipated. The total rate is expected to be 11s. 3d. It is understood that the Finance Committee, when they finally dealt with the rates question, asked for, and received, a promise from the Gas Committee of a contribution in relief of rates from the Gas Estate of £4000. Last year the Gas Estate contributed £3200; the Electricity Estate, £2200; the Tramways, £2100; and the Markets, £500. But none of these budget for any contributions for the current year. This promise of the Gas Committee is very generous, not only because it is the only estate contributing to the relief of rates, but because of the extra expense the estate is put to on account of the higher price for coal and wages. During the past year, there have been two awards granting additional bonuses to the employees, in each case the amount being 5s. At the present time the employees of the Gas Estate are being paid 34s. 6d. per week bonus, which is higher than the amount paid in any other trading department of the Corporation.

When the rate was levied last week, Mr. Henry Ball, the Chairman of the Gas Committee, said he was very glad that they had seen their way to promise a contribution of £4000 towards the relief of rates. They were pledged to contribute to the Corporation and ratepayers generally 1 p.ct. of their original capital; but during the past year, owing to their somewhat stronger financial position, they were encouraged to increase the amount of this by £800—making in all £4000. He attributed their position to the excellence of the management of the works.

For the next meeting of the Town Council, the Gas Committee propose that a Provisional Local Joint Works Committee for the gas employees (other than administrative, technical, and clerical) be set up for considering matters relating to terms and conditions of service. The Committee will consist of eight members—four representing the Gas Committee and four the employees.

The Bradford Education Committee are considering a novel scheme of adult education in literary, scientific, musical, art, history, and geographical subjects. On the science side, it is suggested that the curriculum should include lectures, practical experiments, and demonstrations in coal gas and its use, the smoke problem, and the principle of electric lighting.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *April* 11.

The London tar products market continues in a strong position. Ships are rather plentiful, and makers of pitch are fully occupied in loading this useful product for export. The value of pitch is well over 120s. net per ton f.o.b. makers' works. Creosote is worth 1s. to 1s. 1d. net per gallon in bulk. The demand for motor benzol is fully maintained.

There is nothing new to report as to the position of sulphate of ammonia.

Tar Products in the Provinces.

April 12.

The average values for gas-works products during the week were: Gas-works coal tar, 77s. 6d. to 82s. 6d. Pitch, East Coast, 120s. to 127s. 6d. per ton f.a.s.; West Coast—Manchester, 117s. 6d. to 122s. 6d.; Liverpool, 117s. 6d. to 122s. 6d.; Clyde, 122s. 6d. to 127s. 6d. nominal. Benzol 90 p.ct. North, 2s. 3d. to 2s. 4d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 2d. to 2s. 4d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. 3d. to 3s. 4d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 11½d. to 11½d.; salty, 7d. to 7½d. Heavy oils, in bulk, North, 11½d. to 1s. Carbolic acid, 60 p.ct., 3s. 8d. to 3s. 10d. Naphthalene, £30 to £35; salts, £8 10s. to £9 10s., bags included. Anthracene, "A" quality, 8d. to 9d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is not much change to note in the markets for tar products. Prices remain firm, and there is no indication of weakness in any direction. The demand for pitch is as strong as ever, at last quoted prices. Offerings are not very free; and it would seem as though a higher price is being looked for. Shipments are still being made from London at £6 10s. f.o.b., and forward sales are fixed at higher rates. There is still a great demand for benzol; but prices have not been advanced, although stocks are light. Distribution is improving. Creosote is steadily inquired for; but no further price advance is to be noted in the Provinces, although London rates are higher. Carbolic acid is quiet, with quotations dearer, although difficult to fix in the case of crystal. Firms who were used to an export trade are unable to obtain licences. Shipments are, however, being made—between 400 and 500 tons were sent away last month. Naphthalenes are becoming scarcer and dearer. This is an unusual position for crudes;

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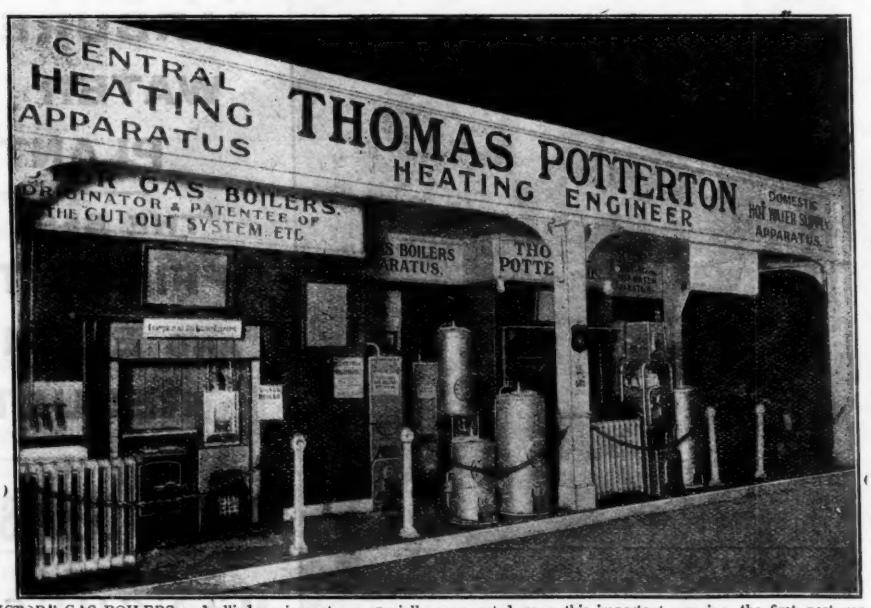
NEAR HAMMERSMITH ROAD ENTRANCE.

Special Exhibit of Hot Water Supply and Heating Apparatus.



Potterton's "VICTOR" GAS BOILERS and allied equipment are specially represented upon this important occasion, the first post-war exhibition of the Building Trades.
WORKING EXHIBIT demonstrating to the general public the advantages and economy afforded by properly designed hot water supply and heating apparatus.
A cordial invite is extended to all Engineers and Gas Companies' Representatives.

THOMAS POTTERTON, BALHAM, LONDON, S.W.12.

for at this time of year one expects the demand from the firelighter industry to have ceased or slackened. Refined flake has sold up to £30. Naphthas are steady. There is nothing fresh in intermediate products; but in view of the refusal of export licences, easier conditions in the home trade are being looked for. A few imports from America are noted; but these are too small to have effect. Salicylic acid is not available for early delivery, and makers are not anxious to quote forward.

Latest quotations are as follows:

Benzol: 90% London 2s. 4d. to 2s. 5d., North 2s. 3d. to 2s. 4d.; 50-90% 2s. 2d. to 2s. 3d. London, 2s. 1d. to 2s. 2d. North; crude 60-65%, 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Crude Tar: London, 72s. 6d. to 77s. 6d.; Midlands, 70s. to 72s. 6d.; North, 70s. to 75s. per ton *ex* works. Refined tar, 48s. per barrel (free) on rail.

Pitch: London, 130s. per ton; East Coast, 125s. to 130s. per ton; West Coast, 115s. to 130s., with Manchester 125s. per ton, and Glasgow 120s. per ton; South Wales, 135s. per ton.

Solvent Naphtha: London, 3s. 8d. Provinces average 3s. 6d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 6d. per gallon.

Naphthalene: Refined, £33 per ton nominal; crude, £13 to £18, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 1s. 0½d. to 1s. 1d.; North, 1s.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 5d. to 1s. 6d. per lb., drums extra.

Aniline Salts: 1s. 10d. to 2s. per lb.

Cresylic Acid: 95%, 4s. to 4s. 6d.; 97-99%, 4s. 3d. to 4s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 4s. per gallon; crystals 40%, 1s. 3d. to 1s. 4d. per lb.

Salicylic Acid: Technical 3s. 3d. to 3s. 6d.; B.P. 3s. 9d. per lb.

Sulphate of Ammonia.

Home movements have begun again after the holidays; and although export inquiries are good, little business has been done. Much of this demand must remain unsatisfied; but higher prices are likely for this part of the trade. From £35 to £40 has been noted lately. From the Pacific Coast of America, a very important centre of the trade, comes the news that the market there is dead for the time being. All stocks not taken by the Japanese are being held at the highest figures; and only the most urgent necessity would impel local users to buy at current rates. It is feared that the shortage of sulphate of ammonia will offset the good effect of propaganda work carried out during the past few years.

American Tar Products.

Very few price changes have occurred, and except for further advance of spot material there is little to report. General opinion is that no relief from current high prices is in sight. Demand is good, with very little available for early delivery. Technical salicylic acid, on more active demand, has increased to 60c. per lb. The spot market in aniline oil continues cramped; but prices are firm at about 40c. The salts are almost unobtainable, with a nominal quotation of 48c. per lb.

Improved Labour Outlook in America.—An improvement in the labour situation is noted by Mr. H. L. Kerwin, the Director of the Bureau of Mediation and Conciliation of the Department of Labour in the United States. During the past fiscal year, the Department have assigned Commissioners of Conciliation to 1780 cases, made up of 278 strikes, 1113 disputes and threatened strikes, 63 lockouts, and 17 "walkouts." In only 111 intances did the Commissioners fail to make a settlement. "In spite of all that has been said and done," he declares, "a better feeling exists to-day between the working man and his employer."

Vertical Retorts for Accrington.—At a meeting of the Accrington District Gas Board last Thursday it was reported to members that a Committee had discussed with Messrs. R. Dempster and Sons the final terms of their tender for the installation of vertical retorts. The contract will include a special arrangement for side outlets for coal-bunkers, and a gantry in connection with the coke-tip, with a narrow-gauge railway. The whole of the work is to be completed within eighteen months. Alderman Dewhurst said the Committee gave the matter careful consideration, and accepted this tender as the best. Immediately permission to borrow was granted, the work would be commenced. The General Manager (Mr. A. J. Harrison) reported that the increased consumption of gas this year was about 50,000,000 c.ft. There had been a higher production and a higher output than ever before in the history of the undertaking.

Coal Scarcity and Gas Consumption.—Among the resolutions submitted at a meeting of the Council of the Newcastle Chamber of Commerce last week, was one that, "in view of the great scarcity of coal in Europe, this Association urges his Majesty's Government to ration gas and electricity for domestic purposes, thus freeing a considerable quantity of coal for export, and thereby supporting foreign exchange." The Chairman (Sir A. Munroe Sutherland) pointed out that the Chamber was constantly asking for the removal of control, and yet the resolution requested the rationing of gas and electricity. In a discussion that followed, reference was made to highly illuminated streets and signs, especially in London. Mr. D. T. Hobkirk said that he had talked over the subject matter of the resolution with the Coal Controller, who said the consumption of coal in lighting was so little in excess of war time that he did not intend to do anything in regard to gas and electricity. The resolution was dropped.

EVERY GAS ENGINEER

SHOULD VISIT

STAND 121, Row G.

Building Exhibition at Olympia,

APRIL 10th — 24th.

Among the many interesting Exhibits will be found a Model of Sulphate of Ammonia Stores rendered with Acid Novoid Concrete, instead of the usual Lead Lining, at an immense saving of cost. Also Novoid Concrete Tank holding Tar Liquor, etc.

THE TORBAY & DART PAINT COMPANY, Ltd.,

26-28, Billiter Street, London, E.C. 3.

H. Marsh & Co. (Manchester), Ltd., is the title of a company registered on the 3rd inst. as "gas specialists" of No. 17, Albert Street, Manchester. The capital consists £10,000 in £1 shares, 3000 of which are 7 p.ct. cumulative preference shares and 7000 ordinary.

Wirksworth Gas Light and Coke Company.—The accounts adopted at the annual meeting showed an increase for the year of £2760. A dividend at the rate of 2 p.ct. was declared (this being the lowest of recent times), less income-tax. A sum of £203 has been allowed for depreciation, against £14 last year, when the dividend was 3 p.ct.

Auckland Gas Company, Ltd.—The profits of the Company for the year 1919 amounted to £55,483; the Chairman (Mr. J. H. Upton) explaining at the meeting that there had been an increase of 5 p.ct. in the quantity of gas sold. Various other statistics were quoted by him to show the satisfactory progress of the Company. Increased costs have had to be met by a higher charge for gas. Considerable extension has been decided upon at West Tamaki. The dividends for the year absorbed £55,186, leaving a surplus of £297.

Captured in a Gas Office.—A man named George Peel was sent to prison for a month at Gateshead, on a charge of having been found in the Redheugh office of the Newcastle and Gateshead Gas Company, between 2 and 3 a.m. on Good Friday, with intent to steal. It was stated by John Smith, the night watchman, that the building was surrounded, and accused discovered in the time-office, where two drawers had been forced open, and the contents strewn about the floor. Nothing, however, was missing. A window had been broken, and an entrance thus effected. Accused pleaded that he had been drinking, and had not the slightest idea what occurred.

Two "Richmond" Water-Heating Appliance Demonstrations.—The Richmond Gas Stove and Meter Company recently held demonstrations of water-heating appliances at Cardiff and Newport, by arrangement with the respective gas undertakings. In conjunction with these, lantern lectures were delivered by Mr. A. H. St. Leger, the Richmond Company's Water-Heating Engineer. At Cardiff, the Superintendent of the Technical School took the chair; and a large audience—including many of the gas undertaking staff, local gas-fitters, architects, surveyors, plumbers, &c.—was present, in addition to students of the Technical School At Newport, the Deputy-Chairman of the Gas Company (Mr. George Green) presided; and deep interest was shown by the audience in the lecture and in the apparatus exhibited.

Stockton Gas-Works Results.—During last year, the Stockton-on-Tees Gas-Works saved the ratepayers the equivalent of a 10d. rate. The income for 1919-20 was estimated at £94,900, but amounted to £120,200. Coke sold realized £34,500, as against an estimated revenue from this source of £22,600; and the receipts from tar, oil, and pitch came to £6000, instead of £1500. Gas-rents realized £76,600, as against £67,200; and stove-rents produced £1000, an increase of almost £200. The expenditure was £109,400, as compared with £93,300, the amount estimated. Coal cost £45,000, an increase of £1000; wages were £9496, almost £1000 more than had been anticipated; the expenditure on water gas was up by almost £2000; war bonuses amounted to £16,200, as compared with the original estimate of £13,500; and meter repairs needed an extra £2000. It is estimated that the working will cost £120,240 during the coming year. The largest increase is on account of war bonuses, which are set down at £19,240. The income is expected to amount to £121,000, which includes £40,000 from the sale of coke.

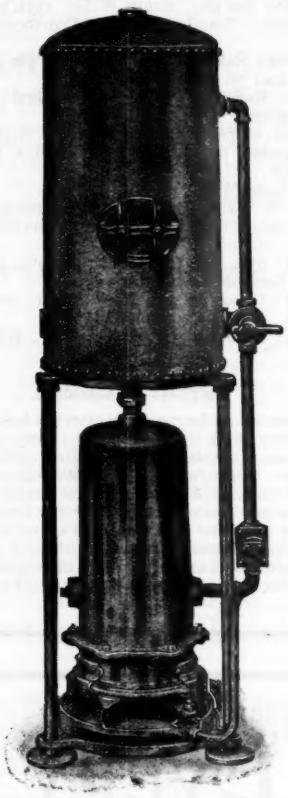
APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for April 8.]

Nos. 9057—9534.

Anderson, W.—"Apparatus for treatment of oil or tar." No. 9267.
Armstrong, Whitworth, & Co., Sir W. G.—"Burners for furnaces and kilns." No. 9241.
Barrett Company.—"Controlling temperature reactions." No. 9505.
Barrett Company.—"Manufacture of tar." No. 9506.
Beard, G. F. H.—"Method of quenching hot coke, &c." No. 9314.
Beaver, A. G.—"Fittings for gas, &c., lighting." No. 9373.
Boocock, M.—"Recovering ammonia from ammoniacal liquor." No. 9415.
Bowers, W. R.—"Clock-controlled gas-lamps." No. 9473.
Boyer, J. G.—See Armstrong. No. 9241.
Bray, G. A.—"Flexible couplings, &c." No. 9197.
British Mannesmann Tube Company.—"Pipe-joints." No. 9384.
Chawner, W. H.—"Inverted gas-mantle protector." No. 9166.
Cleary, E.—"Apparatus for the vaporization and gasification of liquids." No. 9517.
Cowper-Coles, S. O.—"Gas-fires." No. 9173.
Dempster, R. & J. See Beard. No. 9314.
Henshaw, D. M.—"Apparatus for bringing liquids and gases into intimate contact." No. 9432.
Holmes & Co., W. C.—See Boocock. No. 9415.
Holmes & Co., W. C.—See Henshaw. No. 9432.
Humphries, H. B. P.—"Means for automatically controlling sources of illumination." No. 9095.
Klencke, H.—"Process for the production of sulphuric acid without chambers and towers." No. 9386.
Knight, H. F.—See Humphries. No. 9095.
Meikle, J —See Anderson. No. 9267.
Muirhead, A. E., I. G., & M. A.—"Heating and lighting." No. 9192.
Ross, D.—"Pipe-joints." No. 9384.
Schmiedel, T.—"Device for bringing gases or vapours and liquids into intimate contact." No. 9385.
Schmiedel, T.—See Klencke. No. 9386.
Sun Elecrical Company.—See Beaver. No. 9373.
Sutherland Meter Company.—See Bowers. No. 9473.
Thorp, F. & H. T.—"Injectors for gas-burners." No. 9399.
Trier, F. H.—"Cocks, taps, valves, &c." No. 9088.
Whittell, J.—See Henshaw. No. 9432.

THE
"IRONCLAD"
SET
Durable—Year—after—Year.



The "Ironclad" complete with Thermostat, swing-out burner, and cylinder with "cut-out" valve.

This combination hot water circulator and storage cylinder is ideal for new houses or in cases where no hot water system is already installed. As a labour-saving device that is efficient, reliable, and practically indestructible, its many special features at once appeal to Architects, Builders, and all interested in Housing Schemes.

The cylinder is provided with a special "cut-out" valve which temporarily reduces its capacity when moderate quantities of hot water only are required.

Visitors to the International Building Trades Exhibition are invited to inspect the comprehensive display of "Richmond" equipment for Housing Schemes at STAND No. **137a.**

THE RICHMOND
GAS STOVE AND METER CO., Ltd.
London Offices & Showrooms - 164-172, Queen Victoria St., E.C. 4
(City 7450)
Works ——— Warrington

Cairo has been subjected to lighting restrictions, owing to coal shortage.

The Devizes Corporation have received sanction from the Ministry of Health to borrow £17,000 for gas-works purposes.

A proclamation dated Feb. 10 prohibits the importation into Australia of calcium carbide, except under licence from the Minister of State for Trade and Customs.

A report in "The Times" stated that the Leeds Corporation electricity supply for both power and light failed last Wednesday for over an hour, causing a stoppage of work in local factories.

John Henry Audsley (aged 54), an employee at the Dewsbury Corporation Gas-Works, died on Friday last at the infirmary from injuries supposed to have been caused by an accidental fall at the works. On the previous Wednesday afternoon, he was found unconscious on the floor of the charging room. He had been filling coal-hoppers for the retorts, and is believed to have overbalanced and fallen a distance of 7 or 8 yards.

The American Cyanamid Company report that during February operations at all plants were on the basis of full capacity.

Cumberland Coal Power and Chemicals, Ltd., have just purchased two Cumberland collieries and coking-plants with a view to their development as auxiliaries of the projected works at Great Clifton for the manufacture of ammonia products. They had already acquired other properties.

The accounts of the Gas Lighting Improvement Company for 1919 show a net profit of £39,024, after making provision for excess profits duty for the year. The Directors recommend a dividend on the ordinary shares making 15 p.ct. for the year, leaving £73 to be carried forward, subject to additional remuneration to the Board. During the year £31,016 of the reserve was capitalized, £27,016 of which was distributed to the ordinary and the then founders' shareholders as bonus ordinary shares, and the balance of £4000 was used to provide the ordinary shares required to complete the conversion of the founders' shares into ordinary shares. The authorized capital was increased to £250,000 by the creation of 150,000 ordinary shares.

STOCK MARKET REPORT.

QUIET as business on the Stock Exchange was in the week which preceded Easter, it was quieter still in the four days which succeeded that popular interruption to serious work. But here all resemblance between the two periods began and ended; for the air of cheerfulness which characterized the first was entirely lost, and all the old uneasiness and apprehension which had depressed markets in the previous month was again in full swing. Both Home and Foreign financial problems, and doubts and fears regarding the approaching Budget, impressed the advisability of masterly inactivity, while a new factor of perturbation arose in the form of the French advance into Germany. The result was general gloom pretty well all round the markets.

In the gilt-edged department, Home Government issues of all descriptions gave way rather freely, but made a partial recovery later with the exception of Funding. Friday's prices were: Consols 45¾-46⅜, War Loan 87⅞-88 5/16, Funding 67⅞-68½, Victory 75½-76½. Home Rails were almost unnoticed; Argentines were dull.

The Foreign Market was dull. The franc fell to another low record. Russians and Chinese were weaker.

The Miscellaneous Market showed much dulness. Rubber and Oil moved irregularly, but mostly in a downward direction. Textiles, Iron and Steel, Nitrates, and Mines showed a loss.

Business in the Gas Market was very quiet and dull, and there seemed to be little disposition either to buy or to sell—an attitude which is likely to endure at all events until the Government Bill (promised "after Easter"), to relieve the industry from the monstrous injustice which has almost crushed it, is actually introduced. For lack of support, the tendency of prices was rather easier. In the London Companies, Gas Light ordinary was quoted 1 lower; but the other two companies did not move. Suburbans also were unchanged; but Alliance and Dublin fell 4, doubtless in view of the local troubles. In Continentals, Imperial was quiet and dull; the quotation falling 2. Primitiva prices were rather jumpy. The ordinary shares rose ⅛; while the preference fell ⅛.

Bargains done for cash during the week were as follows: On Tuesday, Bournemouth preference 9⅛, European 7, Gas Light ordinary 52½, 52⅝, 53, 53⅜, 53½, 53⅜d., Portsea "C" 59½, Primitiva 28s. 9d., South Metropolitan 54½. On Wednesday, Gas Light ordinary 52⅜, 53, 53½, ditto debenture 48⅛, Imperial Continental 124½, 125, Primitiva preference 50s., San Paulo preference 7½, ditto debenture 39½, South Metropolitan 53, 54½, ditto preference 92, Cromer £33 6s. 8d. On Thursday, Commercial debenture 49, European 7, Gas Light ordinary 52½, 52⅝, 54, ditto preference 57½, 58, ditto debenture 48, Imperial Continental 125, 125½, 125⅜, 126, Primitiva 27s. 6d., 28s., 29s. 9d., ditto preference 47s. 9d., 51s. 3d., South Metropolitan 53¾, South Suburban 66, Tottenham "A" 69. On Friday, Commercial 3½ p.ct. 50, Gas Light ordinary 52½, 53, 53½, ditto debenture 48⅛, Imperial Continental 123, 124½, 126, Primitiva 27s. 6d., 28s., ditto preference 47s. 9d., South Metropolitan 53½, 54⅜, Barnet "C" 136½.

In the Money Market, a condition of marked ease ruled throughout the week; supply being largely in excess of all possible demands. The price dropped materially; 69d. being the closing figure. The Bank rate is 6 p.ct., as fixed on Nov. 6, 1919.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When ex-Dividend	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 28, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	..	58–63	..
1,551,868	,,	Mar. 26	2½	3.6%	Alliance & Dublin Ord.	53–54	37–42*	..
874,000	,,	Jan. 15	4	4%	Do. 4 p.c. Deb.	76–79	61–63	..
260,000	5	Oct. 30	⅞	8%	Bombay, Ltd.	5½–6½	5–5½	..
50,000	10	Feb. 26	16	10%	Bournemouth Gas and Water { 10 p.c. B ¶ p.c. Pref. 6 p.c. 4 p.c. Deb.	20–30	8½–9	..
888,110	10	,,	¶	¶%		15–15½	9–10	..
115,000	10	,,	6	6%		13½–14	8½–9	9½
162,065	—	Dec. 30	—	4%		..	64–66	..
999,645	Stk.	Feb. 12	14	30/-	Brentford A Consolid.	261–265	45–50	..
734,920	,,	,,	11	26/3	Do. B New	204–209	40–45	..
55,000	,,	,,	6	5%	Do. 5 p.c. Pref.	109–111	74–76	..
221,406	,,	Dec. 11	4	4%	Do. 4 p.c. Deb.	91–93	64–66	..
214,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig.	208–213	121–126	..
244,200	,,	,,	8	6½%	Do. A Ord. Stk.	154–159	80–85	..
1,287,500	Stk.	Feb. 26	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	20	Sept. 26	12½	10%	British	44–45	25–27	..
192,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88–90	59–61	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85–87	47–50	..
100,006	10	—	—	—	Cape Town & Dis., Ltd.	1½–2½	7½–12	..
180,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4–6	6½–7	..
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	72–76	58–63	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108–110	..	..
1,513,380	,,	Feb. 26	5/9/4	88/4	Commercial 4 p.c. Stk.	106–108	54–59	..
560,000	,,	,,	5½	26/8	Do. 8½ p.c. do.	108–105	50–55	50
475,000	,,	Dec. 11	8	8%	Do. 8 p.c. Deb. Stk.	69½–71½	49–51	49
800,000	,,	,,	4	—	Continental Union Ltd.	76–79	27–32	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115–118	40–60	..
51,600	Stk.	Feb. 26	14½	10½%	Croydon A 10 p.c.	..	130–140	..
278,409	—	,,	11½	7½%	Croydon B and C ¶ p.c.	..	90–100	..
492,370	Stk.	—	6	5%	Derby Con. Stk.	138–138	..	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102–104	..	..
1,009,180	10	Jan. 29	13	5/0	European, Ltd.	17½–18	7–9	7
16,299,975	Stk.	Feb. 12	4/17/4	30/-	Gas { 4 p.c. Ord. 8½ p.c. max. Light and 4 p.c. Con. Pref. Coke 5 p.c. Con. Deb. 16 p.c. Bonds	98–102	52–55	52½–54
2,500,000	,,	,,	8½	26/8		76–79	40–45	..
4,999,935	,,	,,	4	4%		96–99	57–60	57½–58
4,674,850	,,	Dec. 11	8	8%		73½–74½	48–50	48–48½
180,000	,,	,,	10	10%		..	..	..
82,500	,,	Mar. 11	5	8.3%	Hastings & St. L. 5 p.c.	..	55–60	..
252,748	,,	,,	3½	2.3%	Do. 8½ p.c	37–39	33–43	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½–16¾	8½–9½	..
66,500	Stk.	Mar. 11	9	6½%	Hornsey ¶ p.c.	..	88–93	..
131,000	,,	,,	7½	5.3%	Ilford A and C.	151–154	86–91	..
65,780	,,	,,	6⅞	4.7%	Do. B	115–118	65–70	..
95,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92–94	59–43	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	156–160	123–128	123–126
1,325,000	,,	Feb. 12	8½	8½%	Do. 8½ p.c. Deb. Red.	84–86	80–86	..
235,243	,,	Mar. 26	6½	5½%	Lea Bridge Ord. 5 p.c.	119–121	80–85*	..
1,495,985	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A B	211–213 146–148	..	..
806,088	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	,,	Feb. 26	7/5/6	8.3%	Maidstone 5 p.c.	..	52–57	..
15,000	5	June 11	5	5%	Malta & Mediterranean	4½–4¾	1½–2½	..
260,000	100	Apl. 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99–101	89–96*	..
541,920	Stk.	Nov. 27	4	5%	Monte Video, Ltd.	11½–12	72–77	..
1,875,892	,,	Feb. 26	4½	8½%	Newcastle&Gateh'd Con.	98½–99½	63–65	..
539,795	,,	Dec. 30	8½	8½%	Do. 8½ p.c. Deb.	92–93	65–67	..
15,000	10	Mar. 11	—	8.3%	North Middlesex 10 p.c.	..	12–12½	..
55,940	10	,,	7/14/0	6.2%	,, 7 p.c.	14–16	8½–9½	..
900,000	Stk.	Nov. 27	6	6%	Oriental, Ltd.	117–122	103–106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½–7¾	4½–5½	..
68,000	50	Mar. 11	13	7.4%	Portsea, Island B	126–131	66–71	..
180,000	50	,,	13	6.2%	Do. C	118–121	58–58	59½
249,982	5	April 29	6	—	Primitiva Ord.	5½–6	1½–1¾	27/6–29/9
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½–5	2½–2¾	47/9–51/3
631,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91–93	70–72	..
600,000	Stk.	Jan. 29	4	4%	Do. ,, 1911	..	48–51	..
344,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85–87	47–50	..
150,000	10	Mar. 26	6	6/-	San Paulo { 6 p.c. Pref. 6 p.c. Deb.	10½–11	7½–7¾*	7½
125,000	50	Dec. 30	5	5%		47–49	39–41	39½
185,000	Stk.	Mar. 11	10	50/-	Sheffield A	226–234	68–73	..
309,984	,,	,,	10	4½ %	Do. B	222–234	68–73	..
533,500	,,	,,	10	35/5	Do. C	220–225	68–73	..
135,301	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
99,990	10	Oct. 15	9	10%	South African	10½–11½	12–13	..
6,009,895	Stk.	Feb. 12	5/4/0	90/-	South Met. 4 p.c. Ord.	111–113	53–56	53–54½
350,000	,,	Jan. 15	—	8%	Do. Pref.	..	93–95	92
1,895,445	,,	,,	8	8%	Do. 3 p.c. Deb.	72½–74½	49–51	..
234,990	,,	Feb. 24	3½	3%	South Shields Con. Stk.	107–109	103–104	..
1,087,795	,,	Aug. 14	n	8½%	S'th Suburb'n Ord. 5 p.c.	114–116	66–71	66
247,558	Stk.	Dec. 30	8	8%	Do. 5 p.c. Deb. Stk.	116–118	78–83	..
647,140	,,	Nov. 13	7½	8.3%	Southampton Ord.	99–102	61–63	..
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	61–63	..
120,000	,,	Aug. 14		33%	Tottenham { A 5 p.c. B 5½ p.c. 4 p.c. Deb.	135–138	68–73	69
729,275	,,	,,	6	25%		115–117	48–53	..
181,355	,,	Dec. 11	4	4%		87–89	63–65	..
122,380	10	Dec. 30	6	—	Tuscan, Ltd.	5–6	1–3	..
149,900	10	July 1	6	6%	Do. 5 p.c. Deb. Red.	93–95	45–50	..
235,476	Stk.	Mar. 11	5	5½%	Tynemouth 5 p.c. max.	102½–109	72–74	..
80,000	,,	Feb. 26	8½	85/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151–156	83–88	..
225,688	,,	,,	6½	40/-	Do. B 5½ p.c.	129–134	81–86	..
108,075	,,	,,	—	38/6	Do. C	..	81–86	..
140,865	,,	,,	—	38/6	New Ordinary	..	81–86	..
262,000	,,	,,	6½	35/9	Wimbledon 5 p.c.	117–122	83–88	..
92,000	,,	,,	6½	40/-	Epsom 5 p.c.	121–126	83–88	..
88,416	,,	Dec. 30	6	5%	5 p.c. Deb. Stk.	85–89	48–50	..

* Ex Div.

Wellington (N.Z.) Gas Company, Ltd.—The past year was the fiftieth since the Company's inception; and the Directors were able to report a substantial increase in gas consumption. Advances in the cost of coal, materials, and wages necessitated an addition to the price of gas; and the largely increased expenditure was just about covered by the extra revenue. The amalgamation of the boroughs of Onslow and Karori with Wellington will furnish further large demands for gas; and funds for main extensions into these districts may have to be provided in the very near future. After the payment of the dividend recommended, and the transfer of £23,000 to various reserve and suspense accounts, £21,218 is carried forward to the present year.

Messrs. A. & W. Richards are offering for sale by private treaty a new issue of capital by the Folkestone Gas and Coke Company. Particulars will be found advertised in this number of the "Journal."

Thorncliffe Coal Distillation, Ltd., has been registered in connection with the Thorncliffe Coke-Ovens, near Sheffield; the capital being £550,000, in 500,000 preference shares of £1, and 1,000,000 ordinary shares of 1s. each.

Going downstairs on Sunday morning at Vicarage Park, Plumstead, Mrs. Alice Robinson struck a match in a room where there had been an escape of gas. There was an explosion which damaged the room and furniture; and Mrs. Robinson was burned about the arms.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
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SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENSER CHAPMAN & MESSEL LTD.,
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COMPLETE GASIFICATION OF COAL.
BALE AND HARDY, LTD.,
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"FERROX." "FERROX." "FERROX."
A BRITISH Oxide Cheaper and Better than Bog Ore. 35 per cent. Water, 75 per cent. Ferric Hydrate.
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OXIDE LIMITED, Brentford, Middlesex.

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(Established 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.
(See p. 105.)

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
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